

The Quality Systems Group

Final Report and Recommendations to the 22nd ITTC

1. GENERAL

1.1 Membership and Meetings

The Quality Systems Group (QSG) appointed by the 21st ITTC consisted of the following members: A. Bednarek M. Sc. Ship Design & Research Centre, Poland, Dipl. Ing. B. Günther, SVA Potsdam, Germany, Dr. Young-Gill Lee, Inha University, Korea, Dr. M. Yamaguchi, Ship Research Institute, Japan, Prof. Dr. G. Strasser (Chairman), Vienna Model Basin, Austria.

Since the 21st ITTC the group has held five meetings: Vienna, December 1996, Val de Reuil, September 1997, Gdansk, March 1998, Washington, August 1998, Tokyo, March 1999

1.2 Recommendations of the 21st ITTC

- Provide guidance on the steps which must be followed and issues to be addressed by ITTC member organizations to achieve ISO 9001 certification.
- In association with the Technical Committees, produce a new series of publications containing guidelines, recommended procedures and summary descriptions of benchmark data and test cases.

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

1.3 Co-operation with other Committees

The QSG contacted all the Committees of the ITTC and co-operated with the four permanent Committees Resistance, Propulsion, Manoeuvring, and Load and Responses Committees and the Ice Committee. There were also reactions from the Trials and Monitoring Committee, the Environmental Modelling Committee as well as the Stability Committee.

2. GUIDANCE ON THE STEPS WHICH MUST BE FOLLOWED AND ISSUES TO BE ADDRESSED BY ITTC MEMBER ORGANIZATIONS TO ACHIEVE ISO 9001 CERTIFICATION

2.1 General Considerations

If one wants to implant a quality control system one should take care that the organisation or company gains something by this measure. There should not be too many changes to the existing system. The aim is to adjust the existing system to the requirements of the ISO 9001.

It should be avoided to introduce more bureaucracy and where it is necessary it should be done in a reasonable way.



The decisive factor for the success of a Quality Control System is the daily support on all levels and the acting of the management according to the intentions of the system.

The management has to live it!

2.2 Steps to be Taken

- Appoint a Quality Assurance Manager who is directly responsible to the management
- Produce the Quality Manual which describes the Quality Control System
- Produce procedures and work instructions
- Prepare documentation of the instrumentation and test equipment
- Provide measuring standards having a known valid relationship to international or nationally recognised standards
- Assemble form sheets for documentation of all quality relevant occurrences
- Training of the staff
- Plan and perform internal audits

2.2.1 Quality Assurance Manager

The Quality Assurance Manager needs to get training by an external officially accredited institution. The successful training should be documented by a certificate.

2.2.2 Quality Manual

The Quality Manual should be structured in at least three parts according to ISO 10013. The QSG suggests four parts as shown in Fig.1 below.

The Quality Manual and associated Operating Procedures contain mandatory requirements on all of the staff. These

documents should be continually amended and updated as required.

The ITTC QSG has provided for this Conference an extensive Sample Quality Manual which contains descriptions of all the requirements in accordance with ISO 9001

The Quality Manual (level 1) contains a general description of the Quality System of the organisation or company and is open to public. This manual contains 20 sections obligatory by the standard ISO 9001(see Fig.2).

2.2.3 Procedures and Work Instructions

Procedures (level 2) prescribe the actual detail of how the organisation or company operates and how the requirements of the documented Quality System and the customer's contract requirements will be met.

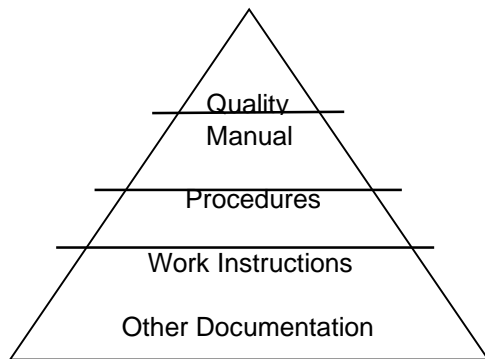
For the numbering the QSG recommends to follow the ISO standard as it makes it much easier for external auditors to check the consistency and completeness of the particular Quality System.

For some of these procedures which are dealing with experiments, extrapolation methods etc. reference can be made to the ITTC Quality Manual which is dealt with in chapter 3 below.

An important aspect is that a procedure in the Quality Manual should describe a practical manner or method how to perform a course of action (calculation method, testing procedure etc.) and is not a scientific paper. However, it should be continually updated in order to represent the state of the art.

The Operating Procedures in particular are strictly commercial - in confidence.

Work instructions (level 3) are prepared according to the needs of individual tasks, jobs or contracts. They may incorporate diagrams or photos if appropriate.



Level 1: Defines Approach and Responsibility

Level 2: Defines Who, What, When

Level 3: Answers How

Level 4: Results - shows that the system is operating, e.g. documentation of instrumentation

4.1	Management responsibility
4.2	Quality system
4.3	Contract review
4.4	Design control
4.5	Document and data control
4.6	Purchasing
4.7	Control of customer-supplied product
4.8	Product identification and traceability
4.9	Process control
4.10	Inspection and testing
4.11	Control of inspection, measuring and test equipment
4.12	Inspection and test status
4.13	Control of non-conforming product
4.14	Corrective and preventive action
4.15	Handling, storage, packaging, preservation and delivery
4.16	Control of quality records
4.17	Internal quality audits
4.18	Training
4.19	Servicing
4.20	Statistical techniques



Examples for a procedure and a work instruction are given in the ITTC Quality Manual Procedure 4.11-01-01 "Control of Inspection, Measuring and Test Equipment", Appendix 3 "Sample Procedure" and Appendix 4 "Sample Work Instruction".

2.2.4 Documentation of the Instrumentation and Test Equipment

Especially for laboratories this item is of importance. Therefore the ITTC QSG prepared a procedure (4.11-01-01) which can also be found in the ITTC QM containing the most important aspects of this task. In the following there are some recommendations which could be useful to pass an audit without too many difficulties.

Maybe you just have too much! The clause "Documentation of the Instrumentation and Test Equipment" of ISO 9001 applies equally to any equipment which an organisation or company uses to make either absolute or comparative measurements. This would include passive elements such as standard references (e.g. a precision block for confirming the adjustment of micrometers).

Most of the cases where an organisation or company is having trouble keeping track of its test equipment results from it simply having too much for its needs. Before plunging headlong into an expensive and administratively difficult scheme for calibration, ask yourself, "What do we need?", rather than, "What do we have?" Here are a few simple steps that could save your organisation or company a great deal of money and make life simpler:

(1) Call in any equipment that isn't actually required and either scrap, sell or, at least for the moment, put it in quarantine until you decide on its future.

(2) If a device is being used for nothing more elaborate than checking fuses or finding

out if a voltage is present or not, then why have it calibrated at all? All you need to do is affix a clear label on it which declares it to be 'NOT calibrated - indication only'.

(3) If 'calibrated' test equipment is only needed once or twice a year then it may be more practical to hold such items in the local office (under controlled conditions). In this way, what are frequently expensive, delicate devices don't spend most of the year bouncing about.

(4) After applying the three ideas suggested above, consider the quantity of devices left which need annual calibration. There may be enough to warrant you verifying the accuracy yourselves. This can be achieved by checking them against a known reference standard which is itself traceable back to a National Standard.

Integrity You are required to make sure that once a piece of testing equipment has been calibrated or verified then the instrument is in some way sealed against anyone tampering with it. Meters and such devices coming back from a testing laboratory usually have three indicators: a separate test certificate giving any indication deviations; a label on the device stating the dates of most recent calibration and possibly the date it will next need to be verified; finally, a tamper-proof seal on the case or over any adjustment screws which are accessible from outside the case.

The storage of test equipment is an important factor. It is advisable to assign lockable cupboards where anything not actually in use can be stored securely out of harm's way.

Often companies establish the frequency of re-calibration when they first introduce a device into the system and never review the periodicity. Procedures should specify in some way that instruments which, over a series of re-calibration checks have been seen to hold their setting could be given an even longer period between checks. Yet on the other hand any



equipment seen to drift away from its designed settings should have the interval between checks reduced; in fact, it may be advisable and more economic in the long term to scrap the device altogether.

Software Many items of test equipment these days are controlled by integrated software. ISO 9001 expects you to confirm at meaningful intervals that what the software is telling you is dependable. In these cases your procedures will have to include some method of verifying that what is being indicated is a reliable statement. Only you are to know how frequently you need to validate the results being presented.

Keep records of all the validation test runs made. These should record the time and date of the test, the identification of the sample used (if you have more than one) and who conducted it. Include a copy of the printout if there is one.

Purchase with calibration Sometimes an organisation or company fails to see why they should have a device calibrated when it has just been newly purchased. The assumption being that one can rely on a newly purchased piece of equipment being correctly calibrated when purchased from a reputable maker. Wrong! The specification found in the handbook, or wherever, provided with equipment only defines the accuracy it is capable of, not what it is currently performing to. It may be that you have the option of purchasing such equipment with or without a calibration certificate. You naturally pay for the certification but this does mean that it has been set up against national standards and can be relied upon for specific levels of accuracy. Refraining from this purchasing option allows you to save money if you really only use the device as an indicator or if you are able to have it calibrated in your own laboratory.

The right conditions. There are many tests and measurements which are only valid if all

the surrounding parameters are correct. Parameters such as temperature, humidity, low ambient sound, freedom from magnetic field and so on. If you have tests to carry out or measurements to take which are perhaps subject to stable controlled environment conditions then ISO 9001 applies to the conditions just as much as the test equipment.

The best practice under such circumstances is to provide a work instruction which clearly defines exactly the conditions required and which instruments to use. Such involved tests justify some form of 'results sheet' which records details of all equipment used and that the optimum conditions were observed.

Correct for the task Don't be caught out by having the wrong device for the job in hand. You need to first consider the deployment of an instrument before you can be certain of its acceptability, even when it is correctly calibrated. For example, if a variable resistor has to be set during the final stages of test set up to a value of 120 ohms within 1%, then there is little use measuring it with a meter which has only been calibrated to be 5% accurate on resistance ranges. Perhaps this is oversimplified but it shows the point.

Measuring Standards Quality relevant instrumentation has to be calibrated in defined intervals. The calibration has to have a known valid relationship to international or nationally recognised standards. In principle one does not have to have the standards available in the own organisation or company but have it calibrated by external providers instead. However, it is advisable to provide some of the more frequently used measuring standards, such as weight, length measurement etc. in the laboratory for easy access.

A more detailed description can be found in Procedure 4.11-01-01 in the ITTC QM-Form sheets (for Quality Records).



Documentation is one of the primary requirement of a functioning Quality Control System. To simplify the task usually form sheets are developed which cover the whole range of aspects of the documented procedure; e.g. Calibration: instrument No., date, environment conditions, used measuring standard, etc. or Customer's complaints: date, subject of complaint, responsible person, remedy, reaction, etc.

An extensive list of possible form sheets is given in procedure 4.16 "Control of Quality Records" of the ITTC Sample QM.

2.2.5 Training

One of the most important aspects of a functioning Quality Control System is the co-operation and motivation of the complete personnel including the management. It therefore will be necessary to train the staff extensively and thoroughly. Everybody of the personnel has to know the intention and the purpose of the Quality Control System.

Motivation of personnel begins with their understanding of the tasks they are expected to perform and how those tasks support the overall activities. Personnel should be made aware of the advantages of proper job performance at all levels, and of the effects of poor job performance on other people, customer satisfaction, operating costs, and the economic well-being of the organisation.

2.2.6 Internal Audits

The requirements for internal audits apply to the quality system, including the policies, practices, products, and services to which the quality system relates. They are not limited to audits of procedures. The purpose of quality audits is to establish, by an unbiased means, factual information on quality performance.

In evaluating the effectiveness of a quality system, audits are an important element. Audits may be conducted by, or on behalf of, the organisation itself (internal quality audit), its customers, or independent bodies.

The standard requires audits to be planned but does not specify whether it is the system or whether it is individual audits that should be planned. The overall plan is in fact a schedule since this should contain dates on which the audits are to be conducted. It is no requirement for audits to be comprehensive, but it is a need to ensure that the audit program covers all aspects of the quality system in all areas in which it is employed.

The standard requires procedures for both planning and implementing audits and these should cover the following:

- Preparing an annual audit program
- The selection of auditors and a team leader if necessary
- Planning audits of each type
- Conducting the audit
- Recording observations
- Determining corrective actions
- Reporting audit findings
- Implementing corrective actions
- Confirming the effectiveness of corrective actions
- The forms on which you plan the audits
- The forms on which you record the observations and corrective actions

A successful internal audit is the necessary condition to be accepted for an external audit. It therefore is very important to plan and perform the internal audit thoroughly and it sometimes may turn out that the personnel needs some more training before another internal audit can be performed to be succeeded by the first external one.

3. ITTC QUALITY SYSTEMS MANUAL

The QSG has assembled an “ITTC Quality Systems Manual” which consists of two volumes.

Volume 1: ITTC Sample Quality Manual (Quality Control)

Volume 2: ITTC Quality Manual (ITTC Recommended Procedures)

Each organisation of the ITTC will receive one hard copy of the ITTC Quality Systems Manual at the Conference.

3.1 ITTC Sample Quality Manual

In order to support the member organisations of the ITTC in introducing a quality control system according to ISO 9000, the Quality Systems Group of the 22nd ITTC assembled a Sample Quality Manual.

This manual is an example of a Quality **Control** Manual containing all the necessary documentation for the implementation of a quality control system. All which is needed is to adjust it to the individual requirements of the particular member organisation. The QSG hopes by submitting this sample to simplify and support the implementation of quality control systems in the community of the ITTC.

3.2 ITTC-Quality Manual (ITTC Recommended Procedures)

According to the recommendations of the 21st ITTC: “A new series of publications in association with the Technical Committees, containing guidelines, recommended procedures and summary descriptions of bench mark data and test cases should be produced.” The manual was assembled. This task is going far beyond Quality Control Systems, as it is directly getting involved in the quality of a procedure itself.

The QSG is aware of the fact that each member organisation has to produce their own quality procedures when introducing a quality control system, however one can refer to the ITTC Quality Manual if considered as convenient.

In order to always pursue the state of the art in the future it will be necessary to update the ITTC Quality Manual continuously.

The ITTC QSG scanned all the ITTC Proceedings since 1955 for adopted “Recommended Procedures” and assembled the adopted, quasi adopted, not rejected or maybe not commented, only suggested recommendations contained in these proceedings. Additionally the respective list of parameters, recommendations of the ITTC for some of the parameters, the corresponding benchmark tests, validation procedures and uncertainty analyses have been added, if found in the proceedings.

The pile of these collected procedures is published as the ITTC Quality Manual (loose sheet file) and it was decided by the Advisory Council that all available procedures should be contained in the ITTC Quality Manual. The first edition is considered as a draft which has to be updated in the future.

The numbering of the Procedures follows the numbering of ISO 9001 Standard. E.g. 4.9 is defined in the standard as “Process Control” which includes all the procedures for experiments, extrapolation methods etc.

The contents of the ITTC Quality Manual is given in the Register 0.0 and the set-up in 0.0-01.

It was decided by the group to also include the general chapters of the ITTC Proceedings which do not change at each conference:

1.0-01 “Description and the Rules of the ITTC”

1.0-02 “Committee Structure of ITTC”



4.9-01-01-02 “Guidelines for Preparation of Technical Committee and Working Group Reports”

As it turned out that there is some confusion about the adoption or approval of the procedures by the Full Conference it was decided in the first meeting of the Advisory Council held on 25th September 1997 in Val de Reuil to prepare a “Procedure for the Adoption or Modification of ITTC Recommended Procedures” (Procedure 4.5-01).

The collected procedures (recommendations) did have different formats and structures. Sometimes a parameter list is given, sometimes it is missing, and so on. This leads to the necessity to standardize the structure and the format of the existing and future procedures. The draft for such a standardized structure is contained in procedure 4.9-01-01-01 “Guide For The Preparation of ITTC Recommended Procedures”. A good example of the outlay of a procedure is Procedure 4.9-01-01-02 “Guidelines for Preparation of Technical Committee and Working Group Reports”.

Taking into account the importance of measurement equipment for Quality Control Systems in the community of the ITTC the QSG also added Procedure 4.11-01-01 “Control of Inspection, Measuring and Test Equipment”.

All the collected procedures were sent out to the respective Technical Committees for revision and correction also with respect to symbols and terminology. The following six committees out of sixteen responded:

Resistance Committee
 Propulsion Committee
 Manoeuvring Committee
 Loads and Responses Committee
 Trials and Monitoring Committee
 Ice Committee

3.3. Discussion of problems arising from the ITTC-Quality Manual

3.3.1 General

Many discussions arising from the request to the committees to proof-read the ITTC-Quality Manual showed that the following items are of some importance:

- Need for a concept. (see Point 3.3.2)
- Need for a “Procedure for the Adoption or Modification of ITTC Recommended Procedures” 4.5-01.

Schedule of the Conference

Presentation of the Recommended Procedures.

- Comprehension of the Committees that the Quality Manual is not a scientific publication
- Voluntary Discipline of the Committees : Quite poor response to the request of cooperation.

Not even one committee stuck to the recommended format of the proceedings, thus causing a lot of additional unnecessary effort for the QSG.

3.3.2 Concept for ITTC-Procedures

On the basis of the now existing Quality Manual there should be developed a concept which procedures need to be revised, updated, skipped or newly developed. So far it is not quite clear who is going to do the job. A big advantage of the ITTC is the diversity of the member-institutions and members; however, this - to a certain extent is also a drawback - as it is quite difficult to achieve agreement on any task. It also turned out that democratic approach for the decision on a physical procedure does not really lead to any solution. So one has to establish democratically a procedure how to adopt Recommendations. (It is almost impossible to achieve unisons).



3.3.3 Comments of the co-operating Committees

There were some positive reactions of some committees and some quite inflexible or even rejecting ones. E.g. one committee rejected all the procedures, -i. e. seven procedures- which have been suggested by the last committee as “recommended procedures” and adopted during the last Conference.

If there was reluctance of a Committee to accept or to agree on publishing an existing Recommended Procedure or if they suggested it for re-consideration or formulated reservations, this is mentioned on the first page of the Procedure.

In the following the **reservations of the Committees** of 22nd ITTC are summarized:

Resistance Committee

Resistance Test (4.9-03-02-01) needs updating

Propulsion Committee

Model Manufacture: Ship Models (4.9-02-01-01) It is recommended that this procedure shall be supplemented .

Propulsion. Propulsion Tests (4.9-03-03-01.1) It is recommended that this procedure shall be rewritten together with the Procedure for Open Water Tests.

Propulsion: Guide for Speed/Powering Trials (4.9-03-03-01.3) The Guide for Speed / Powering Trials of 1996 should be made more detailed.

Propulsion. Open Water Test (4.9-03-03-02.1) It is recommended that this procedure should be rewritten together with the Procedure for Propulsion Tests. The list of parameters and the recommendations for parameters are to be con-

sistent with the parameters of the Procedure for Propulsion Test.

Propulsion: Model-scale Cavitation Pattern Test (4.9-03-03-03.1) The procedure is, in the main, acceptable. It is recommended that the draft for the Section for "Parameters" shall be rewritten. After the completion of this work the Section "Model-Scale Cavitation Pattern Tests" shall be checked.

Propulsion. Description of Cavitation Appearances (4.9-03-03-03.2) The procedure is, in the main, acceptable. It is recommended that this procedure shall be checked after the redrafting and checking of the Guide for Model-scale Cavitation Pattern Test.

Manoeuvring Committee

There were no objections to the submitted Recommended Procedures.

Loads and Responses Committee

There were no objections to the submitted Recommended Procedures.

Ice Committee

General Guidelines (4.9-03 03-04.1) This section is not acceptable in its current form. It should be extensively rewritten.

Test Methods for Model Ice Properties (4.9-03 03-04.2) This whole section should be deleted and replaced with the new recommended procedures given in the report to the 22nd ITTC.

Ice Resistance Tests in Level Ice (4.9-03 03-04.2.1) The committee feels that this section is in general focused correctly but needs significant revisions before being acceptable.

Propulsion Tests in Ice (4.9-03 03-04.2.2) Again the committee feels that this section is heading in the correct direction, but needs substantial revision before being acceptable.



Manoeuvring Tests in Ice (4.9-03 03-04.2.3)
The committee has a major concern that this section does not consider the use of PMM (Planar Motion Mechanisms) for these tests, and is thus inherently incomplete. Nevertheless, depending on the review and revision process, it may be possible to publish this section with a disclaimer, subject to editorial revision by the committee.

Tests in Deformed Ice (4.9-03 03-04.2.4)
It is too premature to give any recommended procedures for the testing of deformed ice under current levels of knowledge. Therefore this section should not be published at this time, but should be reviewed by the next committee and completely rewritten, with a more informational focus.

Ship Trials in Ice (4.9-03 03-04.3)
The committee felt that this section was acceptable with minor editorial changes as suggested by S. Jones. Nonetheless, this section should be reviewed by the next committee.

Trials and Monitoring Committee

The Committee had prepared a new Recommended Procedure for Trials Measurements; however, after there were coming up a lot of discussions and also because the IMO is working on a new concept for trial measurements they decided to keep the old procedure as an interim solution as it is.

3.3.4 Newly supplied Recommended Procedures

As a reaction to sending out the collected procedures some committees asked to implement new procedures in the Quality Manual already now. This has to be considered as an exception because the ITTC Quality Manual in its present form is considered as a draft which has to be up-dated.

The following new procedures are contained in the ITTC Quality Manual without having been adopted by the full conference by now:

Resistance Committee

- 4.9-03-01-01 Uncertainty Analysis in EFD, Uncertainty Assessment Methodology
- 4.9-03-01-02 Uncertainty Analysis in EFD, Guideline for Towing Tank Tests.
- 4.9-03-02-02 Uncertainty Analysis, Example for Resistance Test
- 4.9-04-01-01 Uncertainty Analysis in CFD, CFD Uncertainty Assessment Methodology
- 4.9-04-01-02 Uncertainty Analysis in CFD, Guideline for Ship Hydrodynamics
- 4.9-04-02-01 Uncertainty Analysis, Example for Resistance and Flow

Manoeuvring Committee

- 4.9-03-04-03 Captive Model Test Procedure

Ice Committee

- 4.9-03-03-04.2 Test Methods for Model Ice Properties.

3.3.5 Suggestions of Member Organisations

There were also some comments from member organisations mainly dealing with the formal naming of the procedures. It was general reservation about calling them “Standard Procedures”. There was also some consternation that a member organisation had to follow the procedures obligatorily. One or two comments consider the “ITTC Recommended Procedures” as futile.

Some comments were on the numbering and the set-up being quite complicated.

The QSG considers these suggestions as quite useful, but often not complete, even compared to the already existing “Recommended Procedures”.

There seems to be the concern that some of the member organisations could not or are not willing to follow the recommended procedures. The QSG clearly states that no member organisation has to apply the recommended procedures. On the other hand if the reason is that some essential requirements are not met it is the organisation's responsibility as it was before.

3.4 Future Development

3.4.1 Future Development of the ISO 9001

There is a revised Standard for Quality Control Systems in preparation by the ISO which will be decided not before 2000.

The new standard will follow a different approach and will be process oriented.

A working draft of the ISO 9001-2000 and 9004-2000 was available to the QSG.

In the following the QSG cites part of the draft for the intended modifications:

"The drafts for the standards are in early stage of development, and are being issued to provide much needed early information on the future standards, as regards structure and scope.

The specified role for the future ISO 9001 standard is *"To provide confidence as a result of demonstration, in product conformance to established requirements."* while that for the future ISO 9004 standard is *"To achieve benefit for all stakeholders groups through sustained customer satisfaction."*

It is intended that the standards will be generic in nature, showing their use in such diverse sectors as hardware, software, processed materials and services.

The standards are aimed to be a 'consistent pair'. The most apparent changes are the com-

mon structure of the two drafts based on a process model (see Fig. 3), and the use of the following main clause titles:

- Management responsibility
- Resource management
- Process management
- Measurement and analysis, improvement.

This takes account of the reality that many organisations have already redesigned their quality **management system to be process-oriented**.

The two Working Drafts are presented in a single document format, to demonstrate the 'consistency' between the future editions of the two standards. The proposed changes to the standards represent 'value added', especially in the areas of continuous improvement, customer relations and resource management.

This revision will significantly enhance the scope of the ISO 9004 quality management guidelines standard. Analysis of user needs for this standard have indicated that it should provide guidance that goes beyond the ISO 9001 quality assurance requirements, and should outline "stepping stones" for the establishment of a complete quality management system. The common structure of the pair of draft standards supports this approach by providing an opportunity for a 'seamless' progression beyond a basic quality management system.

This revision will also improve the compatibility of the ISO 9001 and ISO 9004 standards with the ISO 14001 and 14004 Environmental management systems standards respectively.

It is recognised that these revisions will change the 20 element structure of the present ISO 9001 standard. However, it must be stressed that the existing ISO 9001 does not specify requirements regarding the layout or structure of quality system documentation (e.g.



it imposes no rules on the presentation of a quality manual), and neither will the future version. This will continue to allow an organisation to document its quality management system in a manner which reflects its own way of doing business rather than the structure of the standard, providing the technical requirements of the standard are met. It is intended

that each of the current 20 elements will be clearly identifiable within the new structure.

The standards are being prepared using a project approach based on clearly established 'customer' needs, resulting in a task breakdown structure with well-defined tasks."

End of citation.

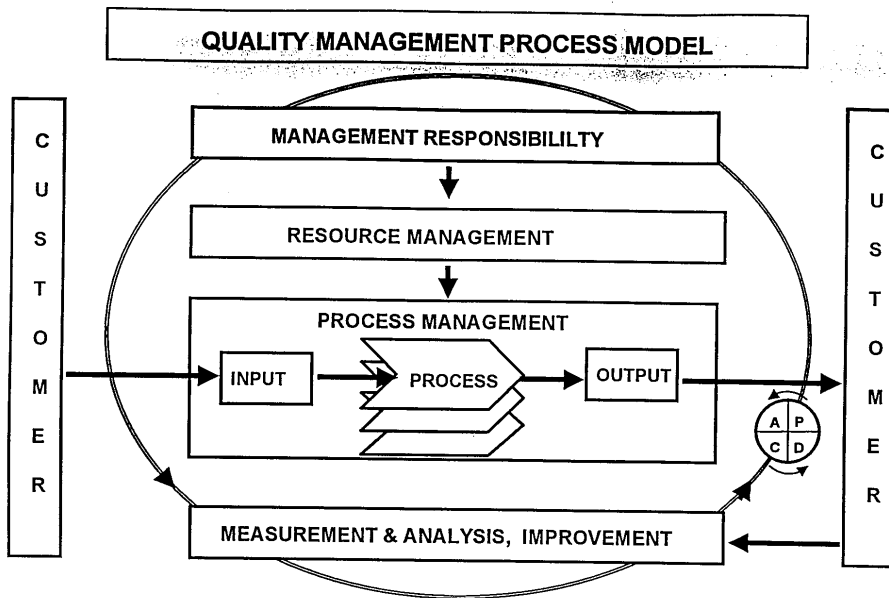


Fig.1 Process Model

4. CONCLUSIONS

In the past, ITTC Procedures have not always been clearly defined. It is not clear which recommended procedures have been accepted by the Conference. Many essential procedures are missing and others need updating.

There has been no process for defining requirements for procedures or to ensure required procedures are written or updated.

RECOMMENDATIONS TO THE CONFERENCE

It is recommended that the draft of the Quality Systems Manual be accepted by the Conference.

It is recommended that the ITTC Procedure for Adoption or Modification of Recommended Procedures is accepted by the Conference, (ITTC Procedure 4.5-01).

It is recommended that the Guide for the Preparation of ITTC Recommended Procedures is accepted by the Conference, (ITTC Procedure 4.9-01-01-01).

Organisations should introduce quality control systems even if they do not intend to be certified by ISO.

The quality systems manuals of ITTC organisations should include references to the ITTC Quality Systems Manual.

Organisations should co-operate in the adoption of ITTC Recommended Procedures.

The existing ITTC Recommended Procedures should be revised and suggestions made for updating, modifying of new formulations. Proposals should be made for new ITTC Recommended Procedures as necessary.

RECOMMENDATIONS FOR FUTURE WORK

Revise the Recommended Procedures of the ITTC Quality Manual and update them if necessary. Modify and re-edit the existing procedures according to the comments of the Conference and the technical committees.

Examine the need for new ITTC Recommended Procedures.

Prepare a schedule for the development and updating of ITTC Recommended Procedures.

The next SaT group should develop recommended procedures for adding to the SaT List.

Prepare or look for a recommended procedure for the performance of benchmark tests including their presentations.

If there is no group for instrumentation, collect procedures for calibrating of standard measurement equipment. (e.g. length measurement devices, thermometers, etc).

Adapt the ITTC Sample Quality Manual to the new ISO standard if this standard has already been established.

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

The Quality Systems Group

Committee Chair: Prof. Gerhard Strasser (Vienna Model Basin)

Session Chair: Dr. Gerhard Jensen (HSVA)

I DISCUSSIONS

On the Set-up of ITTC Recommended Procedures

by Mitsuhiro Abe and Masayoshi Hirano
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We highly appreciate that Quality Systems Group (QSG) has successfully developed a draft of Manual of ITTC Recommended Procedures. It seems very comprehensive that 22nd ITTC QSG, as the first step, collects and binds existing Procedures and/or Guidelines which have already been developed by Technical Committees and approved by Full Conferences so far. We expect that contents of Procedures for model tests or full scale trials be refined and improved through future ITTC activities.

One point which we would like to indicate is that Recommended Procedures prepared by 22nd ITTC QSG do not necessarily cover whole items of ITTC technical aspects. This may be due to the collection of existing materials in the limited time. Regarding this point, we would like to recommend that efforts to improve the above-indicated lack of testing items and draw a future scope for the establishment of new Recommended Procedures be made by future QSG activities. For reference, Table 1 shown below is our proposed set-up of ITTC Recommended Procedures, which is prepared on the basis of ITTC Quality Manual, Section 4.9-01-01 Annex-1 "Set-up of ITTC Recommended Procedure". In Table 1, lines with bold letters indicate newly proposed items, and the others are not or partly modified.

Table 1 Proposed Set-up of ITTC Recommended Procedures

4.9 Process Control

4.9-01 Documentation

- 01 Recommended Procedure and Work Instructions
- 02 Guide for the Preparation of ITTC Recommended Procedures
- 03 Guidelines for Preparation of Technical Committee and Working Group Reports

4.9-02 Model Manufacturing

- 01 Ship Model
- 02 Propeller Model

4.9-03 Testing and Extrapolation Methods

- 01 General
 - 01 Uncertainty Analysis Methodology
 - 02 **Guideline for Uncertainty Analysis**
 - 03 Density and Viscosity of Water

- 02 Resistance
 - 01 Resistance Tests
 - 02 **Pressure Measurements**
 - 03 **Flow Measurements**
- 03 Propulsion
 - 01 Propulsion Tests (incl. Unconventional Propulsor)
 - 02 Full Scale Prediction Methods
 - 03 Guide for Speed/Powering Trials/Analysis
- 04 Propulsor
 - 01 Open Water Tests
 - 02 Cavitation Pattern Observations (incl. Cavitation Inception)
 - 03 **Force and Pressure Measurements**
 - 04 **Flow Measurements (incl. Wake Survey and LVD Measurements)**
- 05 Manoeuvrability
 - 01 Captive Model Tests
 - 02 **Free Running Model Tests**
 - 03 Full Scale Trial/Analysis
- 06 Seakeeping Quality
 - 01 **Motion Measurements**
 - 02 **Resistance/Power-increase Measurements**
 - 03 Full Scale Predictions
 - 04 **Full Scale Monitoring**
- 07 **Stability**
 - 01 **Intact Stability Tests**
 - 02 **Damage Stability Tests**
- 08 Ocean Engineering
 - 01 Model Tests
 - 02 **Full Scale Tests**
- 09 Performance in Ice
 - 01 Model Tests
 - 02 Full Scale Tests
- 10 Performance of High Speed Vessels
 - 01 Model Tests
 - 02 **Full Scale Tests**
 - 03 Waterjet Propulsion
- 4.9-04 CFD Calculation
 - 01 Verification
 - 02 Users Guide
- 4.10 **Facilities and Instrumentations**
 - 01 **Facilities**
 - 01 **Model Tank Descriptions**
 - 02 **Tank Water Qualities**
 - 02 Instrumentations
 - 01 **Measurements**
 - 02 **Data Acquisition**
 - 03 Inspection of Measurement Equipments

Remarks: Lines with bold letters indicate newly proposed items, and the others are not or partly modified.

On Categorizing Equipment at the Quality Manual

by Dr. Eun-Chan Kim, Korea Research Institute of Ships and Ocean Engineering, Korea

I would like to express my sincere appreciation to the members of the Quality Systems Group for their effort and wonderful results of the quality control systems. Our institute KRISO made a quality control system, ISO 9000, which was reported at the 21st ITTC. It was renewed by the same accredited institution, DNV in 1998.

In the view of quality system, the work of ship model test is quite different with other conventional works. I would like to comment as the following:

I suggest that the equipment could be categorized into two parts: 1) basic equipment and 2) dynamometers. Then in the section of 'Control of inspection, measuring and test equipment' of the quality manual, we can regard the equipment in the manual as means only basic equipment, such as weight, length, thermometer or etc.. And we can regard calibration of dynamometers as a part of model test in the section of 'Process control' of the quality manual. If the calibration of dynamometers remains in the section of 'Control of inspection, measuring and test equipment', it is very difficult to continue the quality system. If we regard those in the section of 'Control of inspection, measuring and test equipment' only for basic equipment, we can tightly manage this section.

The names of New series of Publications

by Naoji Toki, Nagasaki Experimental Tank, Nagasaki R&D Center, MHI, Japan

In the second recommendation of the 21st ITTC to the present Quality Systems Group, it is stated "Prepare a new series of publications containing guidelines, recommended procedures and summary descriptions of bench mark data and test cases". Following this

recommendation, the present Quality System Group prepared a series of volumes named "ITTC Quality Systems Manual". The first and second volumes of it are named "ITTC sample Quality Manual" and "ITTC-Quality Manual (ITTC Recommended Procedures)" respectively. These are the results of big efforts, and I think everyone would agree to highly appreciate their efforts.

However, I wonder why the present Quality System Group named the series and the second volume of it "ITTC Quality Systems Manual" and "ITTC-Quality Manual (ITTC Recommended Procedures)", respectively. I am afraid these names may invite the misunderstanding that ITTC has decided to prepare a standard Quality Control Manual for the member organizations.

The minute of the Advisory Council meeting held in Washington D.C. in last August says "the council had agreed at earlier meeting that it did not intend to, and in fact it could not, set up quality control standards for member organizations". And, accordingly, the report of the Advisory Council states "The Advisory Council proposed that the manual of ITTC Recommended Procedures should be published ----- . To assist ITTC members in producing quality systems manual, ----- . To produce a definitive version of the ITTC Recommended Procedures, -----".

From this context, I think it may be more appropriate to change the titles from "ITTC Quality Systems Manual" and "ITTC-Quality Manual (ITTC Recommended Procedures)" to "the Manual of ITTC Recommended Procedures" and "The state-of -the-arts of the ITTC Recommended Procedures etc.", respectively.

What does "Quality Manual" mean?

In the report, it is stated "Quality Manual is suggested to be structured as shown in Fig.1" and the title of Fig.1 is "Organization of Quality Control Book". It should be "Organization of Quality Manual".

However, in Fig.1, the level 1 of the



structure is also called “Quality Manual”. I think these may invite some confusion.

Customer Satisfaction as final Goal of Quality System

by Bruno Della Loggia (CETENA)

As past member of this group I have appreciated very much the work done in the last three years by the Quality Systems Group whose members have to be warmly congratulated.

My present observation causes from the evidence that their work seems only addressed to ITTC internal problems, although it was done according to the 21st ITTC recommendations.

In my opinion we should ever remember that the final goal of our work is the customer’s satisfaction and the Quality Manual is one of the tools to reach this target.

In this moment a lot of attention is paid to the preparation of quality manual and definition of procedures, and relatively few energies are devoted to the definition of indexes for customer’s satisfaction.

Taking also into account that the revised version of the ISO 9001-2000 will put much more attention on this point I think should be recommended for the future work QS Group, the development of some standards regarding the analysis of non conformities and the definition of indexes for definition of customer satisfaction level.

Only in this way would be possible to give significance to all these demanding activities related to quality certification.

Contribution to the Discussion of the Regent of the Quality Systems Group

by B.S. Bowden Secretary, 22nd ITTC Advisory Council

Dr. Jessup has correctly pointed out that the thrust of the work of the new technical committees of the 23rd ITTC will be to revise the recommended procedures and that the revised procedures should be given as appendices to the committee reports. He also said that this may involve too much work for some of the committees and there may be problems in limiting the reports to 50 pages for General Committees and 30 pages for Specialist Committees.

I ask the present technical committees to review the tasks for the new committees and inform the members of the Advisory Council if they consider that there is too much work for the next conference period. I also wish to point out that the number of pages in the committee report could be increased if there is a genuine requirement.

Tasks of Technical Committees and Groups

by Marco Ferrando University of Genova, ITALY

Following the request of Mr. Bowden to the 22nd ITTC committee members to comment on the draft tasks to the 23rd ITTC committees. I’d like to submit some points regarding the draft tasks of the 23rd quality systems Group (proceedings 22nd ITTC Vol.I, pp.283).

1) Since the SaT Group will disappear and since the task list for the QS Group only says “Develop procedures for updating the symbols 2 terminology list”, it appears that nobody is tasked to actually update the list in the forthcoming three years - I strongly recommend that the task list of the 23rd QS Group shall be changed accordingly;

2) Having myself contributed to the work of SaT Group (Prof. Podenzano-Bonvino is a colleague of mine) I can testify that the job of updating the SaT list is huge indeed - To this effect, since a new test is, in my

opinion, to be given to QS Group, I suggest that the number of its members should be in accordance with the increased amount of work.

II GROUP REPLIES

Reply of ITTC Quality Systems Group on On the Set-up of ITTC Recommended Procedures to Dr . Abe

Thank you Prof. Abe. This is a good example for an input for the quality manual. On the other hand, it is not the task of the QS-Group to decide on a new setup. However, it is the right place or occasion to state this here and we are going to forward your suggestion, which we appreciate very much, to the Advisory Council.

Reply of ITTC Quality Systems Group on On Categorizing Equipment at the Quality Manual to Dr. Eun-Chan Kim

Yes, we agree with your comment. It has not been the intention of the QS-Group to give procedures for dynamometers etc. which you categorize as Category 2. This is something which each organization has to do by themselves. An ITTC recommended procedure could only deal with the accuracy of the calibration, not giving a work instruction. It is one recommendation for the next quality systems group to collect procedures (work instructions) for what you call Category 1 equipment

Thank you.

Reply of ITTC Quality Systems Group on The names of New series of Publications to Mr. Toki

The QS Group thanks Dr. Toki for his contribution, it does not make much difference to the group how the manual is called. We consider this as a formalism. The important issue is that there is a collection of recommended procedures with easy access to the ITTC community. It is much more important that the procedures are good and that

they are referred to for that reason. According to our opinion, the Advisory Council is going to discuss this matter further.

Reply of ITTC Quality Systems Group on Customer Satisfaction as final Goal of Quality System to Dr. Della Loggia

The QS Group agrees with the conclusions of Bruno Della Loggia and wants to stress this aspect. However, in our oral presentation a big part was devoted to the new ISO 9000 200 which is going to especially customer's satisfaction and also measures to verify it.

The QS Group is convinced that as a basis for high quality of the results of the different institutions there should be comparable procedures and presentations of the results. For our customers - if they test in different facilities - it is quite often very difficult to decide which of the presented results could be reliable and which not. If the procedures and also the presentation are comparable this will ease the situation and lead to higher customer satisfaction. A second aspect is, that if the recommended procedures are accepted by the community and represent the present state of the art and if this also becomes known to our customers, i.e. they can rely on the services of the member organizations to fulfill at least a reliable standard – the customer's satisfaction will increase to our benefit.

Thank you for your contribution.