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Steps for Achieving ISO 17025 Accreditation in an Air Borne Target Test Range Establishment Laboratory

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ABSTRACT
ISO 17025 has been established with the aim of bringing global standardization to testing and calibration laboratories. Through the requirements set for management, systems, processes and staff, ISO 17025 forms the basic requirements to which a laboratory is accredited. However, accreditation is only achieved once the requirements and guidelines of ISO 17025 have been successfully implemented and continuously adhered to. This paper will discuss the steps involved and the path that can be taken to implement ISO 17025 in an Air Borne Target Test Range Establishment Laboratory. The different salient clauses for the implementation are discussed, as well the different processes and functions which would be necessary for the implementation. The necessity of periodical self-assessment and participation in external quality checks in aid of maintaining and continually improving the quality system is also discussed.

Keywords **- Accreditation, Air Borne Target Test Range Establishment, ISO 17025, Measurement traceability, Reliability.**

1. INTRODUCTION
An Air Borne Target Test Range Establishment (ABTTRE) is dedicated to test rockets, flight vehicles and air borne weapon system produced by various project groups for Army, Naval Services, and Air Force etc. The Test Range are also committed for the continuous improvement towards enhancement in services for safe and reliable launch facility as well as Project / User specified data for performance evaluation of rockets, flight vehicles and air borne weapon system by meeting all applicable statutory and regulatory requirements. The objectives of ABTTRE are as follows:
i) ABTTRE instrumentation and launch facilities deployed for test, launch; Tracking, Data acquisition, Processing and display shall be adequate, accurate, reliable and validated to provide relevant information for flight performance analysis and mission analysis evaluation.
ii) To organize the activities of all divisions and personnel toward meeting the requirements of test objectives of Project Teams (customers) by configuring and providing necessary technical and logistic support for safe flight trials.
iii) Ensure high degree of availability and reliability of system / equipment with most effective maintenance, repair, test and calibration methods.
iv) Formulate work procedures and work instruction for each group/divisions with Quality Assurance guidelines.
v) To provide authentic and validated data to the projects for their Test launches.
vi) Evolve an effective vendor control system for achieving high Quality of bought out equipment materials and services.
Continuously upgrade the skills of Human Resources for achieving excellence in tasks in their respective fields and work places by imparting training and quality awareness programs.
So in order to become a world class competency-based testing facility, it must be ensure that the laboratories of ABTTRE obtain high level of quality in terms of customer satisfaction. So in order to achieve the quality, accreditation according to ISO 17025[1- 3] becomes essential.
ISO 17025 is the International Standard which specifies the general requirements for the competence of laboratories to carry out tests and/or calibrations. This standard contains management requirements and technical requirements. It is applicable to all organizations performing test and/or calibrations.
ISO 17025 is to use as follows:

1. As the requirements for testing and calibration laboratories that wish to demonstrate that they operate a quality system, that they have technical competence and generate technically valid results.
2. As the criteria for laboratory accreditation by the accreditation bodies.
3. To confirm and recognize the competence of laboratories by their clients or regulators. If testing and/or calibration laboratories comply with ISO 17025 standard, they will operate quality system for their testing/ calibration activities that also meet requirements of ISO 9000 series.

2. BENEFITS OF ACCREDITATION
One of the most important benefits of accreditation according to the ISO 17025 standard is to endorse the cooperation and partnership between laboratories and other institutions with the aim of exchanging information promoting the harmonization and standardization of procedures and standards. According to Ramjun [4], a laboratory accreditation strengthens the organization performance through a better control of laboratory procedures and thereby increases their potential due to the increase customer satisfaction. Accreditation is also an effective marketing tool for calibration or for testing, because it is a “passport” for companies and organizations that require reliable and independent laboratories. One of the most important ISO 17025 benefits is to reduce the number of audits and evaluations by customers, since it is

periodically audited by an accreditation body. Additionally, according to Nara [5] and Sousa [6], one important accreditation benefit is that any test or calibration certificate issued by an accredited laboratory that is a signatory of the Mutual Recognition Agreement (MRA) is accepted in any country signatory of the Agreement. The laboratory, thus, gains international recognition for its commitment to quality, competency and reliable results. In addition, ISO 17025 accreditation will signify that the laboratory complies with an internationally recognized standard, thus easing the global exchange of valuable information. There are many other reasons to pursue accreditation. Accreditation is an objective way to assure the customers that the laboratory has demonstrated technical competence to provide reliable and accurate test or calibration results. Accreditation is objective because an independent, third party accreditation body performs annual assessments to verify whether the system is meeting all of the requirements of ISO 17025. This independent evaluation is important to the customer, because it is an unbiased guarantee that the laboratory is performing at its highest level. Another benefit of achieving ISO 17025 accreditation is that it will set the laboratory apart from competitors. ISO 17025 is an ideal management system model for laboratories because it aims to control quality costs, improve measurement accuracy and guarantee consistency of results moreover it is also customer-driven. When implemented correctly, the elements of ISO 17025 work meticulously together to ensure that required quality levels are met and that customers' needs are satisfied. Moreover, according to Duarte [7], the accreditation according to the ISO 17025 standard goes beyond the execution of calibration according to a written procedure and required for a confirmation of technical competence of who performs the proper calibration.

3. PREPARATION FOR IMPLEMENTATION AND ACCREDITATION.

Steps of preparation for the application for the laboratory accreditation are as follows:
Step 1: Detailed study of the standard ISO 17025 accreditation body's rules and regulations
Step 2: Approval from the Management to establish laboratory's quality system.
Step 3: Appointment of the team to set up and monitor the system.
Step 4: Stipulation of policy plan for laboratory management system and establishment of the quality document such as quality manual, quality procedure, work instruction and other documents of laboratory activities.
Step 5: Implementation of the laboratory quality system.
Step 6: Conduction of the internal audits
Step 7: Correction of non-conformities found during internal audits
Step 8: Conduction of a review of the laboratory's quality system to ensure their continuing suitability and effectiveness and introduction of necessary changes or improvements.
Step 9: Contacting the laboratory accreditation body for accreditation.

3.1 DETAILED STUDY OF THE STANDARD ISO 17025

The standard should be read and understood before embarking on the path to implementation and accreditation. A clear, concise checklist that accurately reflects the requirements of the standard is to be prepared and circulated to everyone in the organization so that everybody knows exactly what is expected for compliance.

3.2 APPROVAL FROM THE MANAGEMENT.

Approval from the management is very essential. The implementation program will succeed only if top management is fully committed. It has been found that even marginal wavering by corporate managers is sufficient to divert attention from continuous improvement. The implementation and accreditation requires high initial investment and unless the management agrees, the same would be impossible.

3.3 APPOINTMENT OF THE TEAM.

The team is appointed on the basis of the assumption that it would be capable of:
Defining the Policy, Goal and Objectives
Identifying Key Tasks, Activities, right person for right job
Developing required Documents.
Estimating and Verifying Resource Requirements
Identifying Risks in implementation
Developing Mitigation Plans for the Risks

3.4 DOCUMENTS DEVELOPMENT

Fig. 1 depicts the documents to be developed and their explanation

Figure 1: Development of documents

3.5 IMPLEMENTATION OF THE SYSTEM.

The main objective of this paper is the implementation part. The standard consists of two requirements, management requirements and technical requirements. Majority of the requirements are similar to other systems like ISO 9000, ISO 14000 etc but some technical requirements require a special emphasis for effective implementation.

3.5.1 Clause 5.2 Personnel

Selection and training of personnel for calibration lab work is a critical task. An external auditor can look closely at the record of personnel. Where a repetitive test process has been developed by engineers, it is not necessary to have skilled calibration personnel as operators. The test process itself can

be certified, removing the technical interaction of the operator. Discrepancies, if arises, can be handled by the engineering staff.

3.5.2 Clause 5.4.2 Selection of Methods

A third-party auditor will understand measurement and will be interested in how and why a particular measurement method has been chosen in the procedures. Preparation of documents defending the reasons of choice has to be prepared.

3.5.3 Clause 5.4.5 Validation of Methods

Without validation, no process has credibility. It is therefore very important to validate the measurement processes before they are used. The validation process must include a thorough analysis and statistical verification.

3.5.4 Clause 5.4.6 Estimation of uncertainty of measurement

The requirements of an ABTTRE laboratory are reliability and accuracy. For such a lab the Target Test Range navigation performance accuracy is defined as the degree of conformance between the estimated or measured position and/or the velocity of a platform at a given time and its true position or velocity. It is usually presented as a statistical measure of system error and is specified as:

Predictable: The accuracy of a position in relation to the geographic or geodetic co-ordinates of the earth.

Repeatable: The accuracy in which a user can return to a position whose co-ordinates has been measured at a previous time with the same navigation system.

Relative: The accuracy which a user can determine one position relative to another (by neglecting all possible errors).

The instruments used require all the above and the accuracy and reliability of data decide everything and an error of millimeters can give an effect in kilometers. Fig. 2 shows the Flow chart for evaluation of measurement uncertainty.

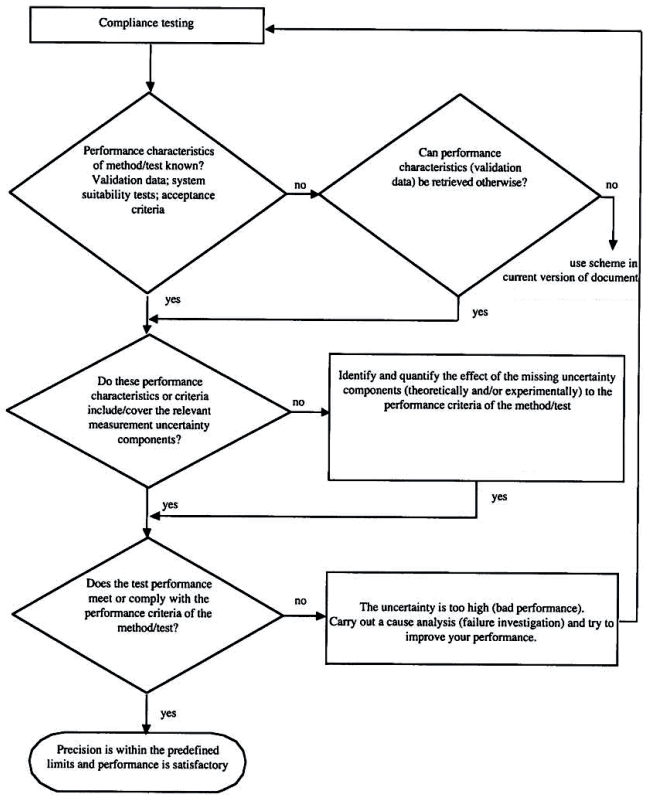

Figure 2: Flow chart for evaluation of measurement uncertainty.

3.5.5 Clause 5.5 Measurement Traceability

This is the bedrock upon which the entire measurement structure of the laboratory is built. State-of-the-art equipment and methods are lost-in-space without a solid, documented, traceability path to national or international standards. The measurement traceability can be depicted as in fig. 3

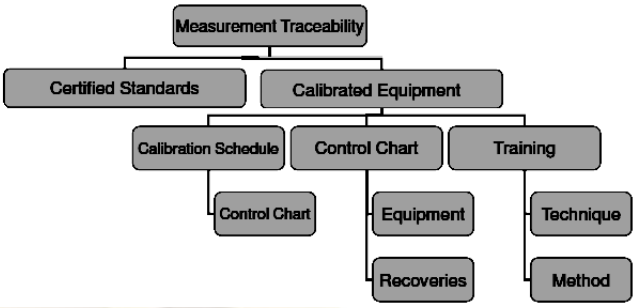

Figure 3: Measurement Traceability.

3.6 INTERNAL AUDITS

Internal audits are conducted to ensure the quality system in compliance with the requirement of ISO 17025, implemented and maintained effectively. The prepared checklist can be used to audit every area that has a connection to the calibration activity. The same checklist can be used in each area, although certain items on the list may not be relevant in some areas. In the beginning, an experienced auditor's services may be used to know the process. In any case the audit should not be postponed until everyone "feels ready"; it should be undertaken as soon as the checklist is prepared. This will obviously show that many things are wrong on the first pass. That will be the

scope for improvement and also motivate the people to prepare and/or repair their processes. This tool should be used for the improvement of the system but should not be made personal to anyone.

3.7 CORRECTION OF NON-CONFORMITIES

Everyone makes mistakes. It is important to acknowledge this fact by having a system that identifies and analyzes mistakes and discrepancies, and changes the process to prevent recurrence. It is important to show that the mistakes do not repeat. If the audit team indicates that the laboratory needs to take corrective action, it's nothing to become alarmed about. However, all non-conformances must be addressed and corrective action taken. The corrective action response must include a copy of objective evidence, such as calibration certificates, laboratory procedures and training records, to indicate that corrective actions have been implemented and completed. There should always be a follow up audit after the correction limited to the area of concern, to confirm that the problem has been resolved.

3.8 CONDUCTION OF A REVIEW OF THE SYSTEM

The review is done by the management review meeting. The agenda in this meeting usually should include:
i) Review of nonconformities raised in the internal audits.
ii) Review of customers' complaints and its corrective and preventive actions
iii) Review of resources and status of implementation
iv) Review of implementation of the Quality policy, Quality objectives, Quality system and effectiveness in achieving the defined objectives and targets.
v) Review of training
vi) Review of any other points (if any)

3.9 ACCREDITATION

As mentioned earlier, a key ingredient of the recipe for quality and competency is third-party accreditation. A laboratory cannot achieve accreditation until it hires a well-recognized accreditation body to carry out a complete and thorough assessment of its laboratory management system. The accreditation body is responsible for assessing the quality system and technical aspects of the system to determine the compliance to the requirements of ISO 17025. It is the accreditation body that ultimately decides whether or not a laboratory is complying with the standard.

4. CONCLUSION

ABTTRE is an Establishment which provides safe & reliable launch facility as well as User specified data for performance evaluation of Rockets, flight Vehicles & Air-Borne Weapon Systems by meeting all applicable statutory & regulatory requirements.
Implementing an ISO 17025 laboratory management system is a means to ensuring efficiency and technical competency in calibration and testing laboratories. A laboratory that establishes a laboratory management system compliant with ISO 17025 joins the growing world partnership of accredited laboratories. An ISO 17025 accreditation certificate is essential to show the potential customers that the ABTTRE laboratory values quality and that necessary steps has been taken to ensure that the calibration or testing results are accurate and reliable.
Since the laboratory of this nature deals with very sophisticated and costly commodity hence the accreditation would ensure the customers that their products will be handled properly and the results would be trustworthy.

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