LABORATORY ACCREDITATION OF THE ACOUSTICAL STANDARDS PROGRAM AT THE INSTITUTE FOR NATIONAL MEASUREMENT STANDARDS

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1. INTRODUCTION

National Metrology Institutes (NMIs), such as NIST in the USA and NRC in Canada and similar national laboratories in other countries should have a Quality System that defines how business (calibration & measurements) is conducted. The ISO/IEC 17025: 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" is the current "Bible" for laboratory assessments.

The question come to mind is that "Why do we need laboratory assessments?" In the old days "Trust us" was the answer, but nowadays, the client may ask "Is the laboratory accredited?" Internationally, there is a higher body: Consultative Committee on Acoustic Ultrasound and Vibration (CCAUV), under BIPM, locates in Sèvres cedex, France, that dictates the behaviour of its memberships, and most NMIs made substantial contributions to maintain their memberships. One of the requirements of CCAUV is that national laboratories must support their claims of calibration and measurements capabilities (CMC) by inter-comparison and with assessment and accreditation of their laboratory calibration procedures.

2. QUALITY SYSTEM FOR A NATIONAL METROLOGY INSTITUTE (NMI)

ISO/IEC 1705 specifies a quality system that covers from "cradle to grave" for calibration laboratories. It may start from the technical expert telephone first contact with a client, the arrival of the devices to be calibrated to the return of the devices to the client. It is essential to have "paper trails" of nearly everything. The Institute for National Measurement Standards has standard procedures that cover the relatively mundane part of the requirements, such as how to handle the instruments when they arrive, but the technical experts of the Institute must ensure that technical requirements are satisified.

3. INSTRUCTIONS TO THE STAFF

One must instruct the staff that spending lots of time in preparing for the accreditation is essential for international recognition but admits that these are "non productive" work. It is not even recognised as professional development or as excuses for "promotion".

The procedures developed for calibration require updating from time to time, but do not assume that these work can be devoted as one's career just to service the procedure manuals.

4 PREPARING THE MEASUREMENT PROCEDURES

The best person to draft the calibration procedure is the person who is going to perform the calibration. The Acoustical Standards Program included some brief theory behind the method used. This will also be a training manual for new employees in future, and to inform the technical assessor who may not be too familiar with the laboratory practice. After the draft and the revised drafts are written, one should have a "dry run" to confirm the steps of calibration. One will be surprised on what one may turn up. If the calibration procedures include some "checking" requirements such as to ensure the FFT analyser is functioning, these "checking" must be documented and noted in the procedures.

5. VALIDATION OF A BLACK–BOX INSTRUMENT

The question on how to validate a black-box such as an FFT analyzer is very difficult to answer. To satisfy the assessment it is necessary to find a simple test that the solution is known. For a FFT analyzer, use a known wave-form such as a square wave with harmonics easily calculated.

6. REDUCTION OF PAPER WORK FOR FUTURE YEARS

It is mandated to update the calibration procedures when there are changes. For example: When new equipment

(a microphone or a DVM) is pressed into service, one must issue a new procedure to reflect the change in the equipment list. It is reasonable to include a statement such as "If the new equipment has similar specifications, the Program Leader can approve the use of the new equipment". This will save a lot of paper work in the future.

7. STAFF TRAINING RECORDS

It is a requirement to have an up-to-date record on staff training that includes specifics on which staff has been trained to perform which calibration. The importance of this can be illustrated with an example:

During the assessment, a question was asked on how the Program Leader, who signed calibration reports, was sure that the calibration results were correct. The initial answer was based on scientific facts: There were four sets of repeated data that were very similar, and the curves plotted were smooth and normal, etc. Not acceptable. The same question was repeated, and the second attempt to answer was that the Program Leader could repeat the measurements himself but he might make mistakes too. Not acceptable.

It turned out that the correct answer should be: There is a training record, signed by the Program Leader, for that particular staff member, and therefore the above calibration results should be correct.

On reflection on the above, one may wonder why scientific evidence is inferior to a signature on paper.

8. SOME SALIENT POINTS THAT MAY BE HELPFUL

If computer programs are used in a calibration, be sure to have an answer on how to verify that the computer programs are correct.

When that program is loaded from a computer file, how can one be sure that it is the correct version of the program? The problem was solved by loading the computer program from a disc every time, and not from the list of programs that reside in the computer.

If the data during calibration are stored in a computer, be sure to use a unique file name to identify that calibration. For example: file names with serial numbers, month & day are not good enough.

9. CONCLUSIONS

A short summary of an external accreditation is presented. Things to remember include paper trails, documentation, and understand how the assessor interprets ISO/IEC 17025. It is known that assessors may have different interpretations. Based on our experience, one may need to issue 30 % to 40 % more documents than our original set of prepared procedures. One final suggestion for those laboratories contemplating ISO/IEC 17025 accreditation: Do not depart from the final focus on accreditation. To resist is futile, comply.

REFERENCE

[1] IEC/ISO 17025, General requirements for the competence of testing and calibration laboratories, 1999.