EMPLOYER-BASED CERTIFICATION PROGRAMMES

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Abstract
This presentation will look at second party certification programmes which are generally termed Employer-based Certification. The programmes operate through an Employer Written Practice/Procedure, which will be usually based on the Recommended Practice SNT-TC-1A or any one of a number of Standards (e.g. NAS 410, EN 4179) or customer specific documents which require that the employer creates a Written Practice/Procedure defining the process of that Company’s NDT operator training, examination and certification process.

The content of the presentation will look at the structure of a Written Practice, responsibilities, training, work experience, exemptions, examination, certification, authority to work, Renewal and Recertification, and the challenges for Companies meeting multiple customer specific requirements. The question will be considered as to whether a single unified global Written Practice might benefit our industry.

Keywords: Employer, SNT-TC-1A, Written Practice/Procedure, NAS 410, EN 4179

1. Introduction
Around the world there are many thousands of NDT operators who are not centrally certified to say EN 473 \[^{[1]}\] and/or ISO 9712 \[^{[2]}\] but to an Employer based second party scheme, probably based on the recommended practice SNT-TC-1A \[^{[3]}\] or the aerospace documents EN 4179 \[^{[4]}\]/NAS 410 \[^{[5]}\].

These Employer-based programmes require the Employer to establish a Written Practice (also called a Written Procedure) for the Training, Examination and Certification of its NDT personnel. This document will specify precisely how the particular Company qualifies its NDT personnel and will be open to audits by purchasers and their representatives.

This paper will look at the various types of programme, the Written Practice and offer some guidance on what to look out for when using certain schemes which are in regular use internationally.
An attempt will be made at identifying issues which may arise when using either Employer based systems or central certification.

2. SNT-TC-1A

The most widely used document for NDT personnel certification is NOT a standard or a code but a framework around which an Employer builds a certification programme which meets the needs of his customer/purchaser. This is done through the creation of a Written Practice which is approved by the employer’s Level 3 and is unique to that employer. The NDT operators are Company NDT Level 1, 2 or 3 and are not ASNT Level 1, 2 or 3, a term which has been used historically and is bound to lead to confusion in the future as ASNT has recently (November 10) added an ASNT Level 2 to its existing programmes for central certification of ASNT Level 3 and the ACCP Level 2 and 3.

ASNT has a variety of NDT certification documents and you are directed to their website www.asnt.org for the latest information on the status of these programmes. Some of these are Employer based programmes and others are central certification.

3. EN 4179/NAS 410

Originally two separate NDT operator qualification programmes for the aerospace industry, these two programmes became technically equivalent some time ago. These are Standards which require the minimum requirement of the standard to be incorporated into an Employer Written Practice as well as defining the Employer specific requirements. Again by doing this, each Written Practice will be unique to a Company and the NDT certification upon leaving that employment until such time as he is certified into a new Written Practice by his next Employer.

The scope of the Written Practice is similar to that of SNT-TC-1A but the minimum requirements of certain areas are quite different meaning that it is not usually possible to move from one scheme to another without further training and examinations by a new employer.

I consider that the template provided by the aerospace industry which is monitored by regular mandatory audit in some areas ought to be considered by other industrial sectors and that this would improve the quality of NDT.

4. Company Written Practice

4.1 Scope

Defines the methods and techniques used by the Company and the applicable Codes, Standards, Specifications etc referenced in the following section. This document needs to meet the needs of the Purchaser.
4.2 References
Codes, Standards, Specifications used by the Employer listed here in full and dated with revision.

4.3 Definitions
Use as appropriate.

4.4 Levels of Qualification
Trainee, Level 1, Level 2, Level 3 - use of a limited certification where allowed should be detailed here.

4.5 Education, Training, Experience, Examination
Detail requirements in words and table form as appropriate.

I am particularly concerned that many Employer programmes do not generally use trainers whose programmes, samples, equipment and staff have been properly accredited either by the Employing organisation or by an independent trainer accreditation such as that operated by BINDT [6].

Training hours differ between certification systems so it is vital that the purchaser is aware which programme is being used, preferably prior to engaging the Company’s services.

Work experience is to be monitored and recorded and must meet the levels specified in the Written Practice prior to Certification.

Examinations must follow the Written Practice. Once again the purchaser needs to be satisfied that his specific needs have been covered in the examination, in particular that the specific theory and practical tests have used the correct samples, configurations and techniques appropriate to the purchaser. For example an NDT Level 2 holds a ‘UT’ certificate and you are asking for tests to be done on a casting. It is vital that the purchaser ensures the supplier’s Written Practice covers UT of Castings not just a general non specific test. This would also be a similar comment for UT of Welds, when the purchaser might want a Phased Array Inspection but the supplier UT examination only covered a simple butt weld.

Pass marks and composite grades must also be carefully considered in the Written Practice. Generally speaking the Employer programme has a 70% pass mark for the general, specific and practical parts with an 80% composite grade by taking a simple average of the 3 components.

It is suggested by some organisations that their certificates may be used to fulfill certain examination criteria e.g. SNT-TC-1A 8.7.1.2 a valid
endorsement on an ACCP Level 2 certificate fulfills the examination criteria for the 8.3 General Theory and 8.5 Practical for each application method, and at 8.1.4 where an exam is graded by an outside agency where the outside agency issues grades of pass or fail only, then the employer may accept the pass grade as 80% for that particular exam.

Now all this is fine until you realise that there is no way for an auditor to confirm that mark so I express concern that where the exact mark is not available (i.e. just a pass/fail) how can an Employer assume a mark of 80% is applicable, just because it says it can in SNT-TC-1A.

4.6 Certification, Authority to Work and Recertification

This is granted by the Employer once all aspects of qualification are met; certification will normally be valid for 5 years on the understanding that there are no issues rising from interruption of work, change of employer, and so on. A recertification process will be defined in the Written Practice. All documents will be retained and available for audit.

It is normal practice for the whole process to be overseen by the Employer’s Level 3.

4.7 Audits

The aerospace programmes are well monitored by regular purchaser audits and the NADCAP programme. Audits of SNT style programmes can be more difficult as I have stated the baseline document (SNT-TC-1A) is a recommendation not a standard.

It is vital however that the purchaser carries out an audit of a supplier using an Employer based programme to ensure that the content of the Written Practice meets his needs in words and action.

5. Conclusions

In order to operate an employer based NDT operator certification system the Company must have a Written Practice approved by the Level 3.

The content of the Written Practice must be agreed between the purchaser and the supplier.

The employer is responsible for giving the authority to work based on technicians meeting the requirements within the Written Practice.

The process is open and auditable.
IRAN CIVIL AVIATION NDT CERTIFICATION ADAPTATION

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Abstract
Safety is very important in aviation, and NDT makes the aviation safe. In 2003 EASA\(^1\) and FAA\(^2\) have come to mutual agreement for harmonization of NDT Personnel qualification standards and terminating the long-lasting debate in aerospace. CAO-IRI\(^3\) "the Iranian local authority" as part of aviation community had the same problems so the regulation needed to be revised.

This paper represents the modification of Iran Civil Aviation NDT Personnel certification rule in order to adapt it to the requirements of EN4179/NAS-410, to provide a vast opportunity for collaboration of the NDT expert, reducing certification lag, contribution of whole national recourses and adaptation with reputable NDT aviation standards.

**Keywords:** NDT Personnel Certification

1. Introduction
Quality control and assurance are the fundamentals of a quality management system which includes the policies and procedures for ensuring the quality of products or services however, Non-destructive testing has significant roles in ensuring the through-life quality and reliability of whole products such as aircraft components. These tests as a quality assurance/control tool in the aerospace industrial have grown larger and more sophisticated day by day very rapidly. Innovation and research in all aspect as materials science, digital technology and nanotechnology are paving the way for new NDT methods. Competence and experience of NDT personnel particularly in aerospace industries are the most important factors in assuring the reliable of the test result. In Iran, more than 100 private and public companies are

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1 European Aviation Safety Agency
2 United States Federal Aviation Authorities
3 Civil Aviation Organization of Islamic Republic Of Iran
active in aerospace industries [1]. They are active in construction, design, maintenance, and training. NDT as part of the quality control and assurance has significant role in the industries. The importance of these tests comes to be inevitable in MRO⁴ or construction companies. Nowadays both of these fields are very active in IRAN. Many presences MRO’s, for example, are very active due the higher average of aircraft fleet age. In such a case, NDT is one of the pillars for maintaining organization and has great effect on the flight safety. Undoubtedly the NDT methods as part of quality control/assurance have great effect on the reliability. To be reliable in NDT, all factors of these tests shall be based on the reputable Standards. Among the factors, the personnel qualification is much more important, so the great care shall be taken for preparation a qualification and certification scheme.

2. NDT Certification and Qualification Program

For reviewing the Certification programs for Non-destructive personnel in civil aviation industry, the presence scheme has been overviewed briefly. There are two programs; In-house certification program and Third party certification program.

2.1 In-house certification program:

This program is also called Second party or employer oriented program. As in this scheme, the employer is responsible for all personnel activities; it is authorized to certify the employees. So the employer may train the NDT personnel based on Qualification and Certification Procedure, called Written Practice. Many American documents such as ANSI/ASNT CP-185, NAS 410, MIL-STD-410 (superseded by AIA NAS 410, but FAA still refer to it as certification standard) [2] and Recommended Practice No. SNT-TC-1A are “In-house” or in other words “Second Party” certification program. In these documents certification defined as:

- Written testimony of qualification (Recommended Practice No. SNT-TC-1A)
- Written testimony that an individual has met the applicable requirements of this standard. (ANSI/ASNT CP-185)

2.2 Third Party certification program:

In contrary to In-house, the Third Party program knows the employer unauthorized to certify the employees. The NDT personnel shall be trained and certified by agency other than the employer and the clients. The

⁴ Maintenance, Repair and Overhaul services
documents other than US are based on this program such as: EN 473, EN4179-2000, Canadian CGSB 48-GP and so on. In this program all training, examination and certification affairs transferred to Training, Examination and Certification bodies. The employer is not authorized to train and certified their personnel solely. People shall be trained by authorized NDT training body and pass the examination in authorized examination body. The issued certificates are not the property of employer. Qualified individual receives their certificate from the Certification Body. In these documents certification defined as:

- Procedure, used by the certification body to confirm that the qualification requirements for a method, level and sector have been fulfilled, leading to the issuing of a certificate. (ISO 9712)
- Procedure used by the certification body to confirm that the qualification requirements for a method, level and sector have been fulfilled, leading to the issuing of a certificate.(EN-473)

### 2.3 Advantages and disadvantages:

Both programs even third party and in-house have advantages and disadvantages:

- **In-house advantages:**
  - Training and certification refer to whom responsible for personnel performance (Employer)
  - Suitable scheme for where specialized performance is required
  - Suitable scheme for industries, where self-regulating certification system is understood by whole hands responsible for quality

- **In-house disadvantages:**
  - The certificate is only limited to the employer
  - The certificate is not portable from company to company
  - It may be only a sealed paper not Written testimony of qualification

- **Third party advantages:**
  - Certification of unqualified person is limited
  - Certificate is not the property of the employer
  - A uniform training, and examination system are used

- **Third party disadvantages**
  - Certified people may be not qualified for specific jobs
Certification is limited to only a few methods
- Certification in new method is time consuming
- Personnel certification and recertification take huge time

In reviewing of the certification scheme, it seems that although in third party program some of the disadvantages of the in-house program have been eliminated but the third party disadvantages are very crucial especially for aviation industries.

**3. The previous national aviation NDT regulation:**
The first and somehow the second national aviation NDT regulations of Islamic republic of Iran are based on the third party program. These certification schemes had been selected due to the fact that like many other countries, almost all Iranian people prefer a central system for qualification and certification of NDT personnel. During the period of the first regulation NDT expert and the managers who were responsible for NDT had experience many problems. In reviewing the second version of the National regulation, more NDT expert was invited to the Certification Board. The board were satisfied to give more right to the employer for training and certification of the NDT Personnel; it means in-house certification program has been accepted.

**4. Second national aviation NDT regulation:**
Based on the second regulation, the employers were authorized to use in-house certification scheme but all their training and certification should be under the closed supervision of the Civil Aviation Organization. While it was not a must for preparation of Written Practice but many employers prepare the WP. All personnel who had been qualified as per the employer Written Practice, should be introduced to certification Board of CAO.IRI for final approval. People who receive the approval of this board were deemed qualified to perform NDT on aircraft.

**5. Level of qualification and NDT Methods:**
Three levels of qualification (Level I, II and III) were assumed for common methods:
- Electromagnetic Testing (ET)
- Liquid Penetrant Testing (PT)
- Magnetic Particle Testing (MT)
- Radiographic Testing (RT)
6. Processes of personnel certification:

6.1 Authorized CAO.IRI training centre:
These training centres were under supervision of CAO.IRI. Those people who passed the training program successfully were eligible to attend the CAO.IRI qualification examination. The examinations were administered by CAO.IRI certification board.
- There were three examinations
  - General examination (computer based examination)
  - Oral examination (field examination)
  - Practical examination (field examination)
- The NDT board was responsible for specific and practical examinations.

6.2 Outside agency:
These agencies worked mostly based on S NT-TC-1A and EN 4179. People who passed the qualification examination successfully, should only attended the Practical and oral examinations of the CAO.IRI. The examinations were administered by CAO.IRI certification board.

6.3 CAO.IRI NDT board:
This board consisted of followings:
- CAO.IRI examination department manager
- CAO.IRI examination department staff
- CAO.IRI NDT designee

6.4 Requirements of the NDT Certification:
- CAO.IRI Airframe and Power plant licenses
- Required documented experience as per CAO.IRI regulation
- Required documented training course
- Successfully passed the CAO.IRI examinations
6.5 Examination:
- Minimum examination grading was based on CAO.IRI regulation.
- Vision examination was based on CAO.IRI regulation.

6.6 Recertification:
- All levels of qualifications shall be recertified annually by the employer under supervision of CAO.IRI.

7. Shortage and limitation:
In spite of the fact that employer could use the in-house certification scheme but as all levels of the qualification shall be certified by CAO.IRI, the certification scheme was third party. Therefore aviation NDT society encounters with same problem of such program.
- Certified people may be not qualified for specific jobs: As the examination question bank had limited resources some the special techniques were not covered.
- Certification is limited to only those methods that explained in paragraph 4.
- Certification in new method is time consuming: In order to prepare the required resources is time consuming; certification in new method is takes time
- Personnel certification and recertification take huge time: As all personnel were certified by an organization therefore they were very busy and some time took huge time.

8. Certification scheme in aviation industries
Qualification and certification of NDT personnel have been started since years and various countries of entire the world consider this issue. SNT-TC-1A was published for the first time by A SNT\(^5\) in 1966. Afterward, considering the significance of the topic, various countries in the world formulated and revised the standards of certification, eligibility and the process of training \(^3\). After establishment of the European Federation of non-destructive testing in 1998, the editing and revising of the European standard was developed rapidly. There were huge difference in European and American standards, this made many difficulties. Finally, EASA and FAA agreed for common standards EN 4179 and NAS410 in 2003. The common version was published

\(^{5}\) American Society for Non-Destructive Testing
in 2008\(^4\). New horizons opened when board assembly formed and NANDTB established during the European Conference on ND T in Berlin\(^5\). On the other hand this standard found global alignment and employed in most of the world as a direct result of EASA regulation part 145, which mandates the implementation of Standard EN 4179\(^6\) by maintenance organizations subject to the regulation and describe a National Aerospace NDT Board as: “an independent national aerospace organization representing a nation’s aerospace industry that is chartered by the participating prime contractors and recognized by the nation’s regulatory agencies to provide or support NDT qualification and examination, and/or certification services in accordance with this standard”. Gradually other countries are jointing to the board.

9. Local Regulation

NDT operation in Iranian aerospace industries has been activated from 1962 although NDT department in the Iran Air which established in 1970\(^6\). In the Islamic Republic of Iran, the first version of certification and qualification of NDT personnel in aviation was ratified in Sep. 1998 by CAO.IRI\(^7\). Based on this regulation, different criteria such as training syllabus, examinations, educational qualification, experience in aerospace, previous type certificate, etc. were evaluated by CAO.IRI. This regulation referred to ISO 9712 and SNT-TC-1A. Next version of certification and qualification of NDT personnel in aviation was developed in 2004 by CAO.IRI referred to EN 4179(2000), ISO 9712 and SNT-TC-1A.

10. Third national aviation NDT regulation:

In 2008 and 2009, CAO.IRI revised parts: 21, 66, 145 and 147 and put them in the portal for polling\(^8\). The “Non-destructive testing – Qualification and certification of personnel” regulation was in the Subpart C of Part 66. This revision was based on EN 4179/NAS 410. In 2009, as per recommendation of this regulation the NANDTB was going to be established in Islamic Republic of Iran. But some Iranian aviation companies were not agreed with these revisions. Because of the ambiguous situation in order to prevent any misunderstanding the revised regulations offered for further study by the aviation community.

11. NANDTB

In 2010, following the revising the national regulation for NDT Personnel Certification and Qualification, a group of experienced NDT experts were invited to certification committee of CAO.IRI for reviewing of NDT

\(^{6}\) EN 4179 has been technically harmonized with AIA-NAS-410 since 2008.
Certification regulation and providing the basis for founding the Iranian National Aerospace NDT Board. In first meeting, the founders came to common goal:

- Updating the national aviation NDT regulation based on the reputable standards
- Eliminating the presence shortages of NDT Certification regulation
- Providing a system for upgrading of the whole NDT society in aviation
- Establishing the annual national aviation NDT expert symposium
- Contacting to other national NDT expert societies such as National aviation NDT board
- Preparation of the NANDTB bylaws

### 12. NANDTB bylaws:

Although as per EN 4179/NAS 410, establishing of NDT Board was not a must, but due to the previous regulation shortages, one foundation of the aerospace nation board was one of the fundamental goals of revising the nation regulation. The objectives and strategy of the Iran-NANDTB:

- Harmonies aerospace NDT department in the Islamic Republic of Iran
- Define and promote best practice in NDT.
- Promote the importance of NDT and related accreditation, certification, Act as the voice of the group of people that work in Aerospace NDT the Islamic Republic of Iran.
- Promote the implementation of R&D projects and their uses.
- Develop and maintain strategic action plan
- Organize conferences and seminars related to NDT
- Organize working groups and make studies in the field of NDT
- Publish Journals, reports in the field of NDT
- Provide support for training certification examinations in the Islamic Republic of Iran
- Offers a route to NDT Societies, members and personnel certification bodies.
- Provide way to become qualified NDT personnel in aerospace as per EN 4179.
13. Conclusion

- As the applied technologies in the NDT methods progress, the role of personnel qualification becomes more vital.
- In-house certification scheme has more advantages to third party certification program in aviation industries.
- Harmonization of NAS 410 and EN 4179 provides better environment for improving the NDT personnel qualification and certification in aviation industries all around the world.
- Iranian aviation community comes to this conclusion that foundation of NANDTB has an inevitable positive effect in aerospace industries.
- Although the Iranian Aerospace NDT Board is not still founded, but it has taken many steps forward.

References

[7] Qualification and certification of non-destructive testing; CAO.IRI; Flight standard licensing-1998
[8] CAO.IRI; Flight standard licensing regulations-2008 and 2009

Now the Iranian National Aerospace NDT Board bylaw has been developed.
<table>
<thead>
<tr>
<th>Author</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alleyne, D.</td>
<td>27</td>
</tr>
<tr>
<td>Almeida, C.</td>
<td>51</td>
</tr>
<tr>
<td>Babu, S.K.</td>
<td>9</td>
</tr>
<tr>
<td>Barnett, D.</td>
<td>9</td>
</tr>
<tr>
<td>De Beer, F.</td>
<td>19</td>
</tr>
<tr>
<td>Demma, A.</td>
<td>27</td>
</tr>
<tr>
<td>Didier, T.</td>
<td>79</td>
</tr>
<tr>
<td>Frank, S.</td>
<td>87</td>
</tr>
<tr>
<td>Holstein, R.</td>
<td>43, 47</td>
</tr>
<tr>
<td>Javaheripour, J.</td>
<td>99</td>
</tr>
<tr>
<td>Kehtari, M.</td>
<td>99</td>
</tr>
<tr>
<td>Lavender, S.</td>
<td>63, 69, 95</td>
</tr>
<tr>
<td>Moles, M.</td>
<td>33</td>
</tr>
<tr>
<td>Mullin, A.</td>
<td>59</td>
</tr>
<tr>
<td>Nothnagel, G.</td>
<td>19</td>
</tr>
<tr>
<td>Radebe, M.J.</td>
<td>19</td>
</tr>
<tr>
<td>Rauschenbach, H.</td>
<td>87</td>
</tr>
<tr>
<td>Sideras-Haddad, E.</td>
<td>19</td>
</tr>
<tr>
<td>Skopál, I.</td>
<td>73</td>
</tr>
<tr>
<td>Teixeira M.J.</td>
<td>51</td>
</tr>
<tr>
<td>Vieira Gomes, L.</td>
<td>51</td>
</tr>
<tr>
<td>Volkova, N.</td>
<td>59</td>
</tr>
</tbody>
</table>