



STRATEGIC BUSINESS PLAN – ISO/TC 135

Executive summary

Non-destructive testing (NDT) is a testing technique used for the examination of materials and components in a way that allows materials to be examined without deteriorating their usefulness. NDT can be used to detect, size and locate surface and internal flaws referred to as discontinuities/imperfection.

Non-destructive testing, which ISO/TC 135 is engaged, ensures the security of persons, properties and also the quality of products, and it affects a wide variety of partners such as:

- national authorities,
- industries where the security is a serious concern such as energy (nuclear, gas, oil), transport (aerospace, railways, automotive, shipbuilding), architecture and civil engineering (buildings, bridges, tunnels, offshore-constructions),
- basic industries (rolling, forging, casting, tubing, welding, etc.),
- mechanical industries (pressure vessels and piping, parts manufacturing, equipment manufacturing),
- testing laboratories and inspection bodies (material manufacturing, pre- and in-service inspection),
- manufacturers of equipment for non-destructive testing,
- qualification and certification body of NDT personnel.

The global NDT market size such as annual overall sales of NDT services and/or equipment is estimated as 10 billion US\$ (based on the survey conducted by Mordor Intelligence added with the data of leak testing and newly developed NDT technology), with annual growth rate of around 7%. This indicates the underlying fact that NDT is utilized vastly in many fields for bunch of applications and it is not practically possible to measure or to estimate precisely.

Some of the standards deliberated by ISO/TC 135 including its SCs are those of general test method standards useful for all partners and can be dealt with as “reference standard” or “application standards” in the frame of specific application to basic industries.

The safety and economic consequences of industrial products are attained only by execution of adequate NDT. The standards developed by ISO/TC 135 and its SCs give the right answer.

There are also general standards such as qualification and certification of NDT personnel, of which objectives are to harmonize skills and techniques of NDT methods to promote mutual recognitions.

A lot of standards prepared by ISO/TC 135 will facilitate the international trade in the global market.

The prime objectives of ISO/TC 135 are:

- To set a clear target for the standardisation work of ISO/TC 135.
- To identify the trend of NDT market and the demand from the industry for potential standardisation work in the field.
- To encourage more participation from interested parties in the subject.
- To promote dissemination of ISO international standards in such a way to harmonize with other norms now prevailing in those countries and/or regions.

1 Introduction

1.1 ISO technical committees and business planning

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important measure which forms part of a major review of business. The aim is to align the ISO work programme with expressed business environment needs and trends and to allow ISO/TCs to prioritize among different projects, to identify the benefits expected from the availability of International Standards, and to ensure adequate resources for projects throughout their development.

1.2 International standardisation and the role of ISO

The foremost aim of international standardisation is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International Standards: [ISO](#) (International Organization for Standardisation) is responsible for all sectors excluding Electrotechnical, which is the responsibility of [IEC](#) (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of [ITU](#) (International Telecommunication Union).

ISO is a legal association, the members of which are the National Standards Bodies (NSBs) of some 164 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the [International Standard](#).

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its [Technical Committees](#) are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the International Workshop Agreement (IWA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardisation represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not accorded the status of an International Standard.

2 Business Environment of the ISO/TC

2.1 Description of the Business Environment

Almost all industrial products except natural resources are processed to final product by a variety of processing method such as cutting, welding, adhesion, curing, etc. These processing methods as well as the material of product may lose their soundness by aging. Even at the time they were produced, they may have some imperfection such as incomplete

welding, adhering, and uneven mixture of chemical components that were not detected at the manufacturing. These flaws will develop from time to time through the use under mechanical stress. At present, not a few industrial products including construction have past long years after their manufacturing and building. They need to be tested and maintained to secure safe use for more years from the economical point of view. Non-destructive testing serves to detect such flaws without destroying the tested object.

There is wide range of flaws such as various kinds of cracks, welding flaws and material degradation. Other than these, there are flaws to cause gas/liquid leak. There is no single NDT technique that can detect all kinds of these flaws. Therefore, industrial society has been applying various NDT methods to detect these flaws.

In order to respond the trend, ISO/TC 135 is divided into several Sub-committees for the method of non-destructive testing based on a particular scientific principle. ISO/TC 135 is composed of the following eight subcommittees (SCs) set up for each method. Only SC 7 dealing with NDT personnel takes care of certification standards commonly used among other SCs:

- SC 2: Surface methods (MT, PT),
- SC 3: Ultrasonic testing (UT),
- SC 4: Eddy current testing (ET),
- SC 5: Radiographic testing (RT),
- SC 6: Leak testing (LT),
- SC 7: Personnel qualification
- SC 8: Thermographic testing (TT),
- SC 9: Acoustic emission testing (AT).

Further, ISO/TC 135 has established liaison with other organization related to NDT.

NDT is rather matured as an industry while each method of non-destructive testing is still developing, reflecting day-to-day innovation in the particular scientific field.

Ultrasonic testing now covers Time-of-flight diffraction testing (TOFD) and phased array ultrasonic testing (PAUT).

In the technical field related to eddy current testing, use of electromagnetic-acoustic transducer (EMAT) and other new applications using electromagnetic technology are being interested and developed.

Radiographic testing now includes computed tomography, neutron radiography, and digital radiography, which means filmless, digital archive and all processed in digital technology.

In leak testing, use of residual gas analyser (RGA) is expanding to detect new refrigerant gases being developed to cope with global warming.

In response to the requests from industries, ISO/TC 135 created two SCs, namely SC 8: Thermographic testing and SC 9: Acoustic emission testing that was separated from SC 3.

Non-destructive testing, which ISO/TC 135 is involved, ensures the security of persons, properties and also the quality of products, and it affects a wide variety of partners described in EXECUTIVE SUMMARY.

ISO/TC 135 has been working closely with CEN/TC 138 and under the Vienna Agreement (Agreement between ISO and CEN to develop EN ISO standards and avoid their duplication), both have been extended cooperation by mutual representation at meetings. The ISO/TC 135 chair and/or the secretary routinely attend the CEN/TC 138 meetings to exchange views and information.

One of the most significant issues in the NDT industry has been the fact that there are several NDT qualification and certification programs in the global NDT market and environment. Within the global NDT Industry there are several NDT qualification and certification (certification and qualification) programs available to an individual. The determination of which program applies is dependent on the requirements of the industry being supported, which is flowed down by the customers. Aerospace has different certification and qualification requirements to that of the oil and gas Industry, who has different certification and qualification requirements to that of the automotive industry, and so on. These differences become problematic for skilled NDT individuals credentialed under one program because it is not fully transportable to another program, creating barriers for freer NDT trade around the globe. To create a harmonized approach to NDT certification and qualification requires each country to advocate, collaborate and support certification and qualification transportability through globally recognized standards. The ISO/TC135 Committee brings together all the respective Standards Developers from those countries to develop and adopt global ISO NDT standards through the ISO Standards Development process. The difference of systems for qualification and certification of NDT personnel by countries and regions makes it rather hard for skilled NDT personnel certified under a certain program to work elsewhere other certification scheme prevailing. A transportable certification credential will reduce technical barriers to trade and open the NDT markets for freer trade.

In such a circumstance, ISO 9712:2012 has been issued as the harmonized certification international standards to succeed EN 473:2008 and ISO 9712:2005. It has been the industry's long cherished wish to have these two similar, but different certification standards converged.

2.2 Quantitative Indicators of the Business Environment

The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the ISO/TC 135.

The global NDT market size estimated by a research company is 8.3 billion US\$ in 2018 (based on the survey conducted by Mordor Intelligence), excluding the market related to leak testing (LT) and some newly developed NDT techniques. When these NDT techniques are taken into account, the global NDT market size is expected to be around 10 billion US\$ in 2018 with annual growth rate of about 7% to 2024.

It indicates the underlying fact that NDT is utilized vastly in many fields for a lot of applications and it is not practically possible to scale.

Even without precise market size indicators, there is no question that the global NDT market is still growing year after year and efforts in standardisation are contributing to it to some extent.

3 Benefits expected from the work of the ISO/TC

Some of the standards deliberated in the frame of ISO/TC 135 are those of general test method standards useful for all partners and can be dealt with as “reference standards” or “application standards” drafted by the other ISO/TCs in the frame of specific application to Basic Industries.

There are also general standards such as qualification and certification of NDT personnel, of which objectives are to harmonize practices of certification bodies to promote mutual recognitions worldwide.

ISO/TC 135 standards should be used widely for attaining/maintaining a high level of safety and reliability industrial products. NDT plays a crucial role in everyday life and is necessary to assure safety and reliability. You can see typical examples in aircraft, motor vehicles, pipelines, bridges, trains, power stations, oil refineries, buildings and oil platforms which are all inspected using NDT.

The safety and economic consequences of industrial products are attained only by execution of adequate NDT. The standards developed by ISO/TC 135 and its SCs give the right answer.

4 Representation and participation in the ISO/TC

4.1 Membership

Current lists of participants and liaisons are found on the ISO website;
<https://www.iso.org/committee/52398.html>

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4.2 Analysis of the participation

ISO/TC 135 is composed of 39 P-members and 29 O-members from all over the world (as of October 2019).

There are a lot of P-members in ISO/TC 135.

They recognize the importance and necessity of international standards on NDT. Nevertheless, the number of P-members that participate in standardization actively by dispatching their expert to ISO/TC 135 or SC is not necessarily enough for our activity.

The lack of experts nominated from those P-members are often baffling sometimes a New Work Item Proposal fails, because the minimum number of experts that require to be put forward for deliberation of a new work item proposal cannot be matched.

In line with the ISO strategy 2016 – 2020, ISO/TC 135 secretariat would be pleased to promote the new program for supporting developing countries to take part to meetings. The involvement of developing countries in the technical work performed by ISO technical committees, subcommittees and working groups is essential in order to ensure that their interests are taken into account, and this contributes to strengthen the global relevance of ISO and of its deliverables.

5 Objectives of the ISO/TC and strategies for their achievement

5.1 Defined objectives of the ISO/TC

The scope of ISO/TC 135 is stipulated as follows:

Standardisation covering non-destructive testing as applied generally to constructional materials, components and assemblies, by means of

- glossary of terms,
- methods of test,
- performance specifications for testing equipment and ancillary apparatus.

Excluded is:

- specifications for electrical equipment and apparatus, which fall within the range of IEC Technical Committees

The missions of ISO/TC 135 are:

- to elaborate for each Non-destructive Testing (NDT) method as set of standards which give the possibility to compare results
 - by verification of instrument or products to perform the testing in comparable conditions,
 - by using the same procedures,
 - by using a common terminology.
- to elaborate standards for qualification and certification of NDT personnel and for qualification of methods.

5.2 Identified strategies to achieve the ISO/TC's defined objectives

The following priority rules are precise for the elaboration of standards in ISO/TC 135:

- to exchange documents by E-mail each time as much as possible,
- to maintain liaison as close as possible with other ISO technical committees involved in specific NDT standard development in order that the standards of ISO/TC 135 are to be referenced in their application standards and the needs of those specific TC can be taken into consideration.

Reprints from the "Introduction" of ISO 9712 Non-destructive testing — Qualification and certification of NDT personnel:

Since the effectiveness of any application of non-destructive testing (NDT) depends upon the capabilities of the persons who perform or are responsible for the test, a procedure has been developed to provide a means of evaluating and documenting the competence of personnel whose duties require the appropriate theoretical and practical knowledge of the non-destructive tests they perform, specify, supervise, monitor or evaluate. An added incentive stems from the worldwide comparability of a wide range of industrial applications requiring common non-destructive testing approaches.

A question of qualification and certification of NDT personnel had been of prime importance to ISO/TC 135 and the secretariat gave the priority to the divergence of ISO 9712 with EN 473 for many years. Now, when a merger of these prominent certification standards has been reached, ISO 9712 would be allowed truly described as a "harmonized" International Standard. This might somewhat inconsistent to the aforementioned attitude, but the secretariat would like to draw members' attention to the fact that every country has its own cultural elements, differences and diversity and sufficient details shall be laid down in the standard to the extent mutual recognition is possible and further details could be left in the

hands of the country's certification bodies.

As it is mentioned earlier, NDT is divided into various methods of non-destructive testing, each based on a scientific principle. There might be a danger that the new work item ISO/TC 135 is about to take up or even the deliverables ISO/TC 135 rolled out may fall into other TC's work scope.

It cannot be avoided as the NDT is cutting across throughout any industrial areas. As soon as such a case is identified in ISO/TC 135 activities including the SCs and WG's, the TC Secretariat needs to be involved in the settlement.

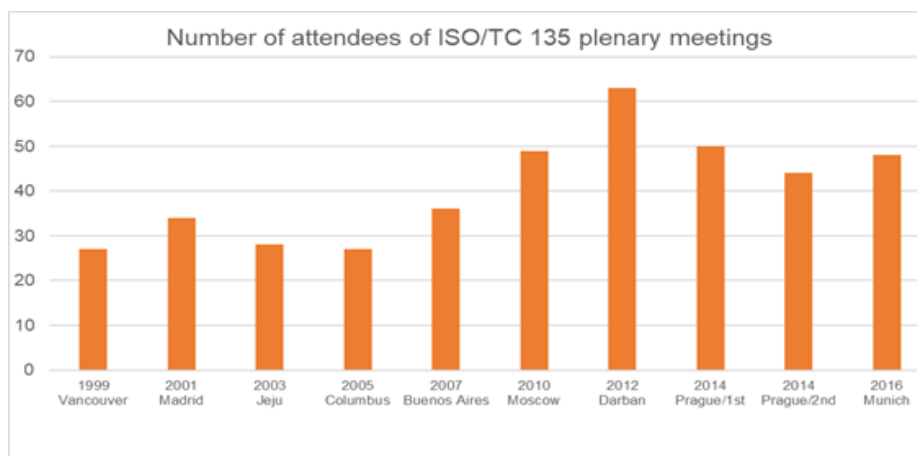
ISO/TS 18173 "Non-destructive testing — General terms and definitions" is a general terminology standard under ISO/TC 135 custody and the update of it has been long pending. This is not good from the viewpoint that the terminology is the first to be taken care of in the ISO/TC 135 priority rules. This needs to be addressed in the coming plenary meeting.

Use of available European Standards brought under the Vienna Agreement through CEN/TC 138 as source documents has been and will continue to be very effective for ISO/TC 135 to promote its international standardisation activities. However, the TC Secretariat would like to highlight the fact that the majority of standards of ISO/TC 135 including the associated SCs are of European origin, namely more than 60 %. It is far beyond the average of other ISO Technical Committees in the said range of 20 %. The needs and efforts to draw sources for international standard from national standards other than CEN standard (EN) shall be encouraged.

ISO/TC 135's daily communication work is conducted by means of e-mail correspondences, but the hot topics such as qualification and certification of NDT personnel needs physical face to face discussion as it is of very subtle and touchy nature.

It was resolved in the plenary meeting 2005 held in Columbus, Ohio that, "Resolution 15/2005: ISO/TC 135 resolved to hold future meetings in conjunction with international NDT meetings whenever possible,"

This might be attributable to the steady growth in the number of attendees one after another to some extent, as you see in the figure here below, but it is sure that it made the schedule adjustment of ISO events and of the host NDT events very hard and the overall session became long resulting in a lot of waiting time between meetings. This inconvenience surfaced in last three plenary meetings repeatedly and eventually, and it was proposed by a host country that the ISO event should take place independently on the successive week after the international NDT events are over. Other than these comments, there is a guidance in ISO/IEC Directives on holding the electronic meeting. In fact, ISO/TC 135 held electronic meeting several times in the past. But most of them were criticized unfavourably by members. However, it is the time for ISO/TC 135 to re-try electronic meeting, taking the recent technical advance in electronic communication into consideration.



Note: No data is shown for 2018 as ISO/TC 135 held no plenary in 2018.

6 Factors affecting completion and implementation of the ISO/TC work programme

Not a few industrial fields in the world use their own standards independent of ISO standards. There is no relevant ISO standard. In order to make ISO standards applicable to every industrial field, ISO/TC 135 should consider the establishment of liaison with other organizations that have now dominant standards (e.g. liaison with aeronautical industries).

The lack of experts nominated by the P-members of ISO/TC 135/SCs is often baffling and sometimes a New Work Item Proposal fails, because the minimum number of experts that require to be put forward for approval of this proposal cannot be achieved.

7 Structure, current projects and publications of the ISO/TC

The structure of ISO/TC 135 may not be sufficient in the future in terms of 1) coping with new manufacturing technology that needs NDT such as additive manufacturing, 2) the expansion of applicable scope of NDT to aged social infrastructure and future social demand for coming hydrogen society, and 3) the request by NDT users for labour-saving NDT works using Artificial Intelligence (AI) technology. ISO/TC 135 must recognize that, in the future, there will be a necessity of expansion of the scope of ISO/TC 135 and its SC structure.

With such understanding, ISO/TC 135 will be operated with the present SC structure and will establish a new SC when a new field of NDT appears, which is out of the scope of existing SC.

Information on ISO online

The link below is to the ISO/TC's page on ISO's website:

<https://www.iso.org/committee/52398.html>

Click on the tabs and links on this page to find the following information:

- About (Secretariat, Committee Manager, Chair, Date of creation, Scope, etc.)
- Contact details
- Structure (Subcommittees and working groups)
- Liaisons
- Meetings
- Tools
- Work programme (published standards and standards under development)

Reference information

[Glossary of terms and abbreviations used in ISO/TC Business Plans](#)

[General information on the principles of ISO's technical work](#)