

NDT PROFESSION, NEEDS and BENEFITS

Prof. dr. sc. Vjera **Krstelj**,

Croatian Society of Non Destructive Testing,

Zagreb, CROATIA, vjera.krstelj@hdkbr.hr

ABSTRACT - With the increase of the responsibility and risks of results the personnel certification in whatever activity seeks to demonstrate that the person has the knowledge and the skills to perform the tasks. Besides, there are additional requirements of the enterprises not only to assure that personnel are qualified, but also to identify the documents by suitable means, equipment traceability and by all means identify the reliability of the results. Professional registration is an important milestone for any engineer or technician in registered professions. The professional status and the actual practice of professional engineering is legally defined and protected by law to define what they are permitted to do. In many cases, only a licensed/registered engineer has the authority to take legal responsibility for the work, particularly in security and safety to carry out project implementation, testing procedure, analysis, repair, servicing, maintenance or supervision of work, process or project. In this paper the focus is on registered professions and the needs and benefits of NDT inspector to be a registered profession.

Keywords: NDT, registered profession, NDT Engineer, NDT Technician, competence.

1. INTRODUCTION

Non-destructive testing, NDT, can be seen as old as humankind, when humans used "Visual method" in comparing products and based on this comparison decided whether to use them or not. The other NDT methods were understood and practiced when the discoveries and the technological advancement took place.

A great number of powerful NDT methods enabled detecting of very small flaws. Because the defects with critical dimensions for products or constructions were detectable, it strongly influenced development of technologies like welding, forging, foundry, materials engineering and many other.

In this process of engineering technology development, a question of the reliability of NDT methods and testing results was intensively raised. It was not so interesting for safety of products or constructions further developing of NDT methods and equipments in sense of sensibility improvement, since in some methods the sensitivity

culminates to the defect detect ability when the dimensions of defects are in the range of defects in nanotechnology.

It seems that the most important question to answer is the one of reliability of detection. So, the question was not only if the parameters of the critical defects are detectable, but what is the chance to overview the defects, even bigger than the critical one.

A steady growth in demands on reliability continues for any individual or organization which has interest to provide NDT service because of the importance and so wide possibility of NDT methods implementation in safety and security throughout the world.

This has led to the formation of many Qualification and Certification schemes to ensure the capabilities for inspection. A great effort was done in harmonization and recognitions of competence. Accreditation is available at the Qualification and Certification centers that are mostly in organization of National NDT Societies.

NDT and Nondestructive Condition Monitoring, NDCM are amongst the most closely regulated of all engineering activities, reflecting and emphasizing how important NDT discipline is throughout the whole industry and how it is important for safety in the world.

Additionally, the European Union Directives affecting the safety of the products in the EU, have started to demand NDT in the products by qualified personnel, such as the European Directive on Pressure Equipment 97/23/CE, and, undoubtedly, the other directives are on the way.

In this very demanding NDT profession where NDT inspectors need more than only competence in NDT methods, it is very interesting how and why this profession is not Registered profession and the NDT Engineers and NDT Technicians are not properly licensed as a Licensed Members of the Engineering Council at National and International level.

2. REGULATION AND LICENSURE IN ENGINEERING

Regulation and licensure in engineering is established by various jurisdictions of the state to ensure the safety of the public by preventing those without proper training from taking jobs where they could cause harm. The licensure process is defined, through which an engineer becomes authorized to practice engineering and/or provide engineering professional services to the public.

The majority of occupations are non-regulated. There is no legal requirement for registration in a non-regulated occupation, although in some cases like NDT, the certification and very regulated practice is demanding and not on a voluntary basis.

People working in regulated occupations, e.g. nurses, engineers, electricians, teachers etc. are controlled by law and governed by a professional organization or regulatory

body and each license is valid only in the state where it is granted. The regulatory body creates entry requirements and standards of practice to certify, register, or license qualified applicants.

Requirements usually consist of such components as examinations, a specified period of work experience, language competency, etc. The requirements are different in different countries, but very similar as it is in NDT profession.

Regulations may require that only a licensed or registered engineer can sign or stamp technical documentation such as inspection results, reports, risk assessment analysis, repair, servicing, maintenance, or supervision of work. Expert witness or opinion in courts in many cases can only be given by a registered or licensed engineer.

How do we know if some profession is regulated?

It is easy to find out the regulated profession in the official lists for regulated professions of the country, region or wider-internationally. The only authentic name of a regulated profession is that of the language of the country in which the profession is regulated.

If someone wants to work in a regulated occupation and use a regulated title, it is necessary to have a license or certificate or be registered with the regulatory body for this occupation. Some occupations are regulated in certain territories and are not regulated in others. In that case, the regulatory body that regulates professions will assess the qualifications and if person is qualified, they will license, register, or certify the person to practice his/her profession in this country.

Some occupations have more different regulated professions included which could be achieved by different approach and could be practiced with different tasks and levels of responsibility (e.g. Chemical engineer, Chemical Laboratory technician). Because of this, the regulated professions are grouped together under the generic name.

In searching the European Commission Regulated profession database being of interest in EU countries the search is “0 item(s) found” when insert NDT and there are only few regulated professions which can be at least in some connection with NDT profession such as the following:

- Technical expert for quality of construction projects, (accepted in 2 countries),
- Vehicle inspector, (accepted in 4 countries),
- Radiographer and Radiation protection officer, (regulated for medicine).
- Vocational education teacher, (lecturer), professor (regulated in 15 countries)

Engineering Council of some EU countries encourages the registration and some countries have additional regulated professions not yet harmonized on the EU list.

In Croatian Regulated profession database, one can find the personnel for aircraft and train maintenance (Engineers and Technicians), and some regulated profession in environment protection.

The appreciated outreach we can find in approach of BINDT as a Licensed Member of the Engineering Council UK. granting the titles “Chartered engineer, (CEng.)”, “Incorporated engineer, (IEng)” and “engineering technician, (Eng Tech)” in NDT. All candidates must satisfy the competence standards set by EC UK and be a member of Licensed Member Engineering Institution.

Incorporated engineer is a first-cycle qualification for Bachelor of Engineering or Bachelor of Science degree holders. Chartered engineer is a second-cycle qualification usually reserved for holders of integrated Master of Engineering degrees.

3. EUROPEAN ENGINEER

Becoming an engineer is a process that varies widely around the world. For the mutual recognition of competence on the EU market, EU Commission has issued Directive 2013/55/EU on the recognition of professional qualifications and Regulation.

The European Engineer (Eur Ing, EUR ING) is now an international professional qualification for engineers. The title is granted after successful application to a National member of the European Federation of National Engineering Associations (FEANI), which includes representation from many European countries, including much of the European Union. It allows a person who has an engineering degree and usually an engineering professional qualification in one of the member countries to use the qualification in others countries.

At the General Assembly of the European Federation of Engineering Associations (FEANI) in Rome on 5 October 2012, nine (9) countries signed the cooperation agreement regarding issuing the Engineering Card, the professional card for engineers. Germany, the Netherlands, Poland, Portugal, Croatia, Ireland, Luxemburg, Slovenia and the Czech Republic who has developed the program for issuing this mobility card for engineers.



The first Eur. Eng card issued in Croatia-2013.by HIS- Croatian Engineering Association,

The mobility of professionals across the EU is essential to respond to labor shortages in key sectors of the economy. In particular, long and complex recognition procedures do not allow professionals to react quickly to job opportunities in other Member States.

To improve that situation the EU Directive 2013/55/EU allows the mobility throughout the EU and wider. The engineering card provides a complete overview of the academic education, professional experience and further training of the card holder.

4. NDT ENGINEER

The education of those engaged in NDT and ND Condition Monitoring can take many forms and levels and can start from various levels; straight from schools obtaining a degree in pure or applied science or in engineering technology study supported by additional professional training.

The harmonization and licensing of engineers and technicians in the field of NDT is a task which must be performed to recognize the competence of the persons engaged in NDT, but also to recognize the NDT as the occupations which MUST be a regulated profession.

The main reason for NDT to be regulated profession is just the same reason for regulation of professions at all;

- to ensure the safety of the public by preventing those without proper training from taking jobs where they could cause harm - .

Not neglecting the importance and required competence of any regulated profession already defined, we can easily explain that person who is not properly educated and without adequate training in NDT profession can make the immeasurable damage for life and environment in comparison with regulated profession already registered. If, for instance, some of NDT inspection in nuclear power station let off critical failure, or NDT inspector who keeps our aircraft, trains and automobiles operating safely; our pipelines and chemical plants from leaking; and bridges from collapsing or in some other artefact/component or product inspected with NDT methods overlooked the flaw, the consequence are fearful.

It is important to understand/explain to those engaged in regulatory institutions;

Engineers in NDT profession are not supposed only to detect a flaw practicing knowledge of NDT methods and choose a proper NDT method with adequate sensitivity and achieve requested reliability. It is also necessary to find the significance of the flaw.

Non-Destructive Evaluation concerns the inspection, characterization and quantification of the 'health' of engineering structures. By risk assessment analysis, it is important to find out the flaw critical dimensions and other parameters such as position and orientation in construction, can it be prevented from recurring and is it the case of repairing or withdrawal of the inspected items.

It will be very hard to answer these questions without the proper knowledge in material technology, manufacturing techniques and all related engineering subjects which can be found in HEI syllabuses. Additionally, NDT as a high technology field driven by computer technology, needs proper knowledge in the Information technology.

University and college programs are currently failing to provide enough qualified candidates to fill the needs of industry. There are not many universities or colleges in Europe which deliver a degree program in NDT. There are more of them in the USA with programs where students can earn NDT degrees. The most NDT specialists in Europe possess a degree in pure or applied science or Engineering study and additional vocational training.

Since NDT is an exciting, growing and high technology career field used by a large variety of industries and safety oriented institutions, one can expect more interest from the industry and students and more opportunities for students in new colleges and university programs that will offer education and degrees in NDT technology.

5. CONCLUSION

Science seems to play an ever-increasing role in our society and the products that we produce and buy are becoming more technical along with demands for high quality that continue to cause the use of NDT technology to grow. The society relies heavily on NDT technology to keep safety and security and a great deal of responsibility is placed in the hands of NDT Engineers and Technicians.

NDT jobs are becoming more demanding. The new NDT methods are emerging and the equipment and methods are constantly changing as engineers and scientists work to make the inspection technology better. So, the competence depends on continuous upgrading of knowledge and skills. Therefore, the competence should be controlled continuously.

The great part of this task is already done by National, Regional and International NDT societies in the process of harmonization of Qualification and Certification of NDT personnel in the last decades. During the NDT week in Zagreb, 7-11th October 2013 at the Certification 2013 Conference, more initiatives to aid harmonization and recognition of personnel certification globally were launched. The ICNDT multilateral recognition agreement (MRA) was signed by many countries and it was again the great success in competence recognition. ICNDT Guide to Qualification and Certification of Personnel for NDT, last updated on 1 October 2014, is the latest document on developing the system of harmonization and MRA. It will be of great help to Regulatory body and Professional organization in creation of law and entry requirements and standard of practice to certify, register, or license qualified applicants; NDT Engineer and NDT Technician.

This work is an appeal to all who understand and have opportunity, but also willingness to help in this very complex problem in appointment of NDT profession as regulated profession with all responsibilities and competences. It will give new opportunities to NDT people to move out from depreciating position of its occupation which should be officially recognized. It will help in awareness of those who can offer support in R&D and finally, it could help in mobility of NDT specialists in accordance with EU Directives.

This is a demanding project and, in my opinion, it is the last minute to start with this as an European project, like EFNDT started a long time ago with harmonization and MRA. Because of such impact of NDT on the safety and life, we, NDT people, are obliged to work on it no matter if we started from our states and approach the EU harmonization late on or in the opposite direction, which is to me much better and faster way, and what was the intention to be clear from the examples given in this work.

REFERENCES

- [1] Regulated profession database, European Commission, http://ec.europa.eu/internal_market/qualifications/regprof/
- [2] Popis reguliranih profesija u RH, Zagreb, svibanj 2013., http://www.husi.hr/download/Popis_reguliranih_profesija_RH.pdf
- [3] EU Directive 2013/55/EU
- [4] Qualification and Certification in CrSNDT; HDKBR info, CrSNDT Journal No. 12.
- [5] Krstelj, V., NDT Education at college and/or university level, Insight Vol. 50 No. 10, October 2008.
- [6] Regulated profession by country, with competent authorities, (www)
- [7] The Official Yearbook of The British Institute of Non-Destructive Testing - 2014,
- [8] Krstelj, V., Invited lecture, HIS u strategiji "Europe2020" Gospodarski forum, Šibenik, svibanj, 2014.