Don't Forget, We are Supposed to Be Representing Industry

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Abstract. We may get significant guidance from industry on the requirement for NDT skills, training, certification, costs and standards; on the other hand being as we are the experts, we may need to encourage or even persuade industry as to what is best for them. In either case, our role is clear; we are here to represent industry, ensuring that they get affordable NDT that meets legislative requirements.
The cost of training, specifically that associated with Specialist Methods, like Time of Flight Diffraction (TOFD) and Phased Array, is very high and in some cases prohibitive; is there something we can do about this or are we content that high training costs will in some cases dissuade some companies from training their operatives appropriately?
In the UK, British NDT Standards have almost entirely been superseded by European Norm Standards; this is okay, it makes it a lot easier for European countries to work across Europe rather than simply in their own country. However, many industries work worldwide and therefore have to conform to both EN standards and ISO standards; so how is the divergence of EN473 and ISO9712 helping this process?
In the UK, the training and standards issues are not helped by an acknowledged skills shortage and the lack of new entrants to NDT; the age profile is alarmingly high and it is noticeable that there are very few young people entering the profession.
This paper discusses the difficulties industry has in maintaining an NDT certificated workforce in the light of spiralling NDT training costs and skills shortages; it also discusses the conformity issues relating to EN and ISO standards.
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1. Introduction

Does industry really know what it wants from ISO and EN standards or does it leave it to Governing Bodies, Institutions and Societies to put in place systems and processes to meet legislative and regulatory requirements. Is it a case of Industry not caring or maybe taking the view that the standards will be put in place anyway irrespective of their involvement or comment? Or do they have total confidence in Governing Bodies, such as those who prescribe and implement National NDT Schemes? Which ever is the case, industry is becoming more reliant on the Governing Bodies, and we have to come up with the goods; we have to get it right, we have to truly represent industry.

In the UK, the industrial contribution to NDT is mixed and varied, we rely on voluntary contributions to underpin the ever increasing activities of the British Institute of NDT, in particular, the Certification Services Division but although we have a full compliment in terms of committee membership, actual attendance at committees is declining; is this because the participants are too busy to attend or do they think it is not important enough. Is this an NDT phenomena or does the disenchantment go much wider? For instance in 2005, we had been at war with Iraq for two years, the decision to go to war was very controversial, it split Europe wide open, yet on 5th May 2005, 40% of the British public couldn't be bothered to turn out to vote in the General Election! In the British Institute we have over 170 volunteers, some of those are representatives of their respective companies, some are representatives of industrial groups and

others are elected for their personal contribution. But are they truly representative of industry or do they participate for other reasons, for instance is it for personal gratification, a passion for NDT, or representing company interests?

There are other NDT issues that will be of concern to international industrialists, for example NDT Training and Certification, International Standards and skills shortages; all of these will impact on the services provided by the NDT industry and the support we provide to industry at large.

This paper is intended to be thought provoking but will not necessarily provide solutions.

2. Training and certification

The repercussions of getting the wrong results from NDT inspections are considerable, often resulting in some sort of commercial impact and in some cases, resulting in injury or even loss of life. It is essential therefore that NDT is carried out by competent certificated operators and that industry can rely on the competence and certification in such a way that it encourages them to continue to invest in modern NDT technology and certification requirements. It is true that different country's Certification Bodies have different views as to the extent of certification required to carry out various aspects of NDT, for example if an operator wanted to be a fully competent in ultrasonic inspection, depending on what country he/she went to, he/she could end up being examined on three samples, eight samples or somewhere in between – the assumption in terms of competence is that the two approaches cannot be the same but is the eight sample approach necessarily correct.

In terms of international harmonisation and cohesion, here lies the problem. EN473, although not inferred in the title, is a minimum standard which is set at a level that everyone can agree upon, although there may be a majority voting rule that I am not aware of. Mike Farley's paper [1], presented at the 16th World Conference on NDT talked about the progress on "Mutual Recognition" but he went on to express the "disquiet in EFNDT circles as to the uniformity of accreditation in different countries". Harmonisation has made progress but there is still a long way to go; the meaning of Harmonisation is described in the dictionary thesaurus as "accord, agree, attune, be of one mind, match and correspond", I don't see a lot of evidence that we are achieving that – maybe it will never be achieved. So what does it mean for countries that for what ever reason have set there standards at a higher level? Since the introduction of EN473, there has been little movement of NDT personnel between countries, however, this year there has been an influx of European NDT personnel into the UK, notably from Poland, whose certification requirements in terms of the number of samples is less than PCN. This presents us with another problem to overcome, having stipulated the certification requirements as those being consistent with PCN, how can I lesson those standards because it would be a convenient way to resolve a resource problem?

There is also an interpretation problem emerging which could lead to industry being deceived, I have seen an increasing number of procurement specifications that quote "NDT personnel need to be certificated to EN473", giving the impression that there is only one standard in Europe and therefore it doesn't matter which country you acquire your NDT personnel from, which of course is untrue.

Until recently, certification has concentrated on the main methods AT, ET, LT, MT, PT, RT, UT and VT; in some countries, Certification Bodies have further developed categories such as within Ultrasonic Testing, you can undergo plate, pipe, nozzles, nodes, T joints, castings, forgings and others. This approach has stood us in good stead for many years but what of advanced technology, there is a big difference in the competence requirements of applying standard NDT on simple geometries and applying advanced technology with complexities of

setting up the equipment and interpreting results; Figures 1 and 2 highlight the need for a different approach to certification; Figure 1 shows a standard ultrasonic thickness measurement of a white metal bearing; Figure 2 shows a phased array inspection of a complex geometry (curved Low Pressure Rotor Blade Root). Although in the UK Lavender International have been instrumental in developing PCN Phased Array and TOFD certification, more providers need to be involved and more modules for other emerging technology need to be developed.

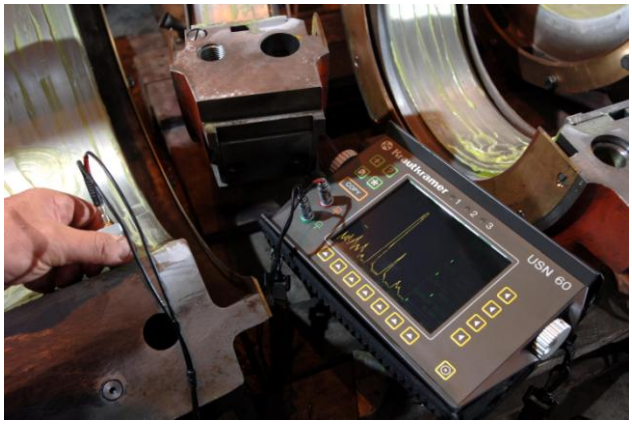

Figure 1 – Ultrasonic thickness measurement of a simple configuration

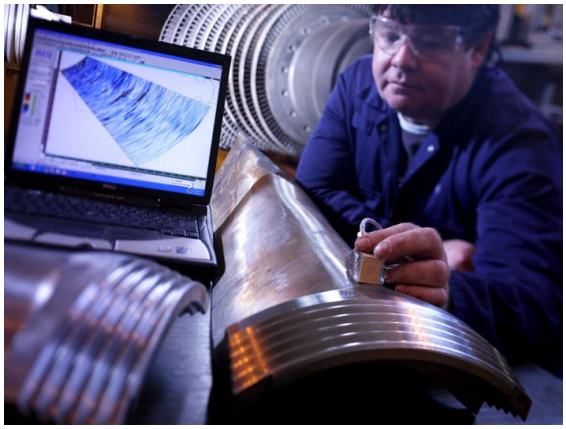

Figure 2 – Phased array inspection of a complex geometry

Advanced technology is also prohibitive in terms of capital costs and training, the volume of equipment purchases and the introduction of competition will eventually see a reduction in the unit cost of capital equipment. However to use advanced technology competently and reliably, it will be necessary for operators to undergo extensive familiarisation and training, provided by equipment suppliers and Certification Bodies. The familiarisation/training provided by equipment suppliers is necessary in order to operate the equipment affectively but often introduces additional costs. As a measure of competence, NDT certification is also required; in order to promote European and International standardisation, the requirements of advanced technology NDT certification should be embodied in EN and ISO standards.

The costs will seem prohibitive but if there is anything we can do to encourage industry to sign on to advanced technology training, is embodiment in EN473/ISO9712 the right answer and how can we make advanced technology affordable to smaller organisations?

3. Comparison of standards

The transition from British Standards to EN and ISO standards has been a long time coming and has not always been to the UK's advantage. The British Standards were often all-embracing and contained most information required about a particular method, for example other than the "Glossary of Terms", BS6072 contained just about everything you needed to know about Magnetic Particle Inspection, whereas, the number of EN/ISO standards providing the same information amounts to eleven. Table 1 lists the MPI standards obtained from a simple search of EN/ISO standards using the search criteria "MPI". This phenomenon is replicated throughout other methods.

Number	Description
BS EN 10228-1	MPI of Forgings
BS EN 10246-12	MPI of Steel Tubes
BS EN 10246-18	MPI of Steel Tube Ends
BS EN 1290	MPI Testing of Welds
BS EN 1291	MPI Welds Acceptance Levels
BS EN 1330-7	MPI Terminology
BS EN 1369	Founding MPI
BS EN ISO 3059	MPI & DPI Viewing Conditions
BS EN ISO 9934-1	MPI General Principles
BS EN ISO 9934-2	MPI Detection Media
BS EN ISO 9934-3	MPI Equipment

Table 1 – List of MPI Standards

This has lead to confusion in industry and very often appropriate standards are missed from procurement specifications and NDT procedures. Furthermore, in some cases the content has changed, with some technical requirements contained within the old British Standards missing from the new EN/ISO standards and vice versa. In the early days, soon after EN/ISO standards were introduced, industry was writing the content of the old British Standards into procurement specifications rather than quoting EN/ISO standards, although this trend has now been reversed.

There is also confusion over EN and ISO standards that cover the same specific subject; the obvious example is EN473 and ISO9712; Industrial organisations who undertake global trading have to conform to both EN473 and ISO9712; they fail to see the reason why they need to be different, particularly as those countries involved in the development of EN473 are also involved in the development of ISO9712. Referring to the 1992 standards development, Rick Murphy wrote [2] "During development of successive editions of ISO 9712, a split developed between the needs of Europe and the rest of the world" but in 2004 Mike Farley stated [1] "At the present time ISO9712 is being revised, primarily to make it still closer to EN473. The final draft FDIS 9712 will be subject to vote late 2004/early 2005". It is now 2007, so where are we now? Are these two standards still converging? Is the end in sight? Will we ever see a single international standard?

4. Skills shortage

In the UK we are in quite a unique situation whereby the majority of the NDT workforce is employed by service inspection companies and not by the plant owners who require the NDT service. This means that the main driver for being involved in NDT is for monetary gain and there is little or no career progression; competency development is left to individual's aspirations and technology investment has to result in a commercial advantage. It is no wonder that the age profile of people involved in NDT is alarmingly high.

A recently published document suggested that the lack of young people joining the NDT industry is a Europe wide problem and not just the UK; one country declared that almost their entire NDT workforce are over the age of 50 years. In the UK the BINDT membership and PCN certification statistics paint a dismal picture in terms of age profile, clearly we need to do something to promote the profession as a worthwhile, exciting career.

In the past four years, BINDT and its partners have been developing educational packages to enhance the profession and to provide opportunities to existing and prospective NDT personnel. These packages include:

- "NDT or your Life" DVD – being developed by BINDT; it is a light hearted but educational introduction to NDT aimed at attracting school leavers; it is supported by all major industry sectors; it covers all aspects of NDT; it will be introduced by the Chief Executive Officer of a major blue chip company; and it will be sent to every secondry school in the country.
- The Modern Apprenticeship in Engineering Inspection – The Apprenticeship Framework has been developed and is managed by BINDT; it requires personnel to be trained in the broader aspects of engineering but with a focus on NDT. RWE npower first piloted the scheme in 2004; it now has two engineers who have completed their Apprenticeship; seven more engineers are at various stages of completion and vacancies exist for two more to commence in 2007.
- The Foundation Degree in NDT – has been developed by BINDT and Northampton University; it is a two year programme that offers considerable exemptions to PCN (or equivalent) Levels 1, 2 and 3 certificate holders; has recently been validated by an external panel; has passed the validation with conditions; and will be in place for the 2007 academic intake from the 1st October 2007. As it is a distance learning degree, it will be attractive and available for overseas applicants and many people already in Industry.
- The BSc Honours Degree in NDT – being developed by BINDT and Northampton University; all/most of the development work has been completed; the programme will last between one to two years depending on personal commitment; it has been designed as a top up to the Foundation Degree; is expected to be completed and validated in 2008 in time for an academic intake in October 2009.
- The Masters Degree in NDT – being developed by Swansea University; will be validated sometime during 2007 in time for the academic intake in October 2007. Northampton University are also intending to develop a Masters Degree in NDT.
- The Engineering Doctorate in NDE – has been developed by the Research Centre for Non-Destructive Evaluation (RCNDE); has been in place for four years; is supported by Imperial College London and the Universities of Warwick, Nottingham, Bath, Bristol and Strathclyde; it is also supported by in excess of twelve Industrial members.

Some of these initiatives are already very successful and others will follow suit; already, one company has invested heavily in this education programme and is reaping the rewards. RWE npower has nine Apprentices going through the Apprenticeship scheme; it has one candidate waiting to register for the NDT Foundation Degree; it has three engineers undergoing an Engineering Doctorate and it is a major sponsor of the DVD.

What is needed though is much more involvement from industry, they need to be persuaded that training NDT personnel to the highest level will ultimately and positively affect the well-being of their plant. Even if we have to couch the benefits in terms of commercial benefit and profit & loss, we need to persuade industry that investing in people is as lucrative as investing in plant.

5. Conclusion

The Governing Bodies of NDT and those who are seeking to promote integration in Europe and in the world, such as EFNDT and ICNDT, are significant organisations that have the power to influence and change the way we promote, develop and provide NDT services. It is necessary therefore, to ensure that whatever we do, we do it in the best interests of industry.

There are a number of factors that need to be addressed in order to provide industry with a robust NDT service and although individually some of these factors may seem remote from certification, they are all interlinked and can alter industry perspective of the provision of NDT.

The three areas that can affect the perception of NDT are "Training & Certification", "National and international Standards" and "Resources/Skills".

Arguably, the UK has put in place an education and training package for the benefit of industry and NDT personnel that would be the envy of other engineering disciplines but, how does the saying go, "you can lead a horse to water but you cannot make it drink". We need to persuade industry to invest in people in the same way they would invest in plant; the extent of certification we provide needs to be appropriate and fit for purpose, not artificially kept to a minimum to reduce costs or to fit within a prescribed time period; the certification we develop also needs to cater for emerging technology.

Standards need to be concise with no overlap between Europe and the rest of the world – EN473 & ISO 9712 – this is industry speaking, one standard please.

Finally, we need to ensure that the NDT profession is pitched at the highest level, alongside other engineering disciplines. A recent article in NDT News [3] was entitled "Engineering Losing Hearts and Minds", the article said that most UK graduates who embarked on an Engineering degree course didn't end up in Engineering and 82% of companies who employ Engineering graduates have said that they are unlikely to attract the number of graduates they require; let us make NDT an exception by building a profession to be proud of.

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6. References

[1] Farley 2004 – 16th World Conference on NDT – "Harmonisation and Recognition of NDT Personnel Certification - Experience in EFNDT"

[2] Murphy 2004 – 16th World Conference on NDT – "NDT Certification – Global Harmonisation"

[3] NDT News – Issue No. 46, June 2007.