

PERFORMANCE BASED QUALIFICATION: AN NDT SERVICE INDUSTRY PERSPECTIVE

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Abstract: The recently established Working Group 7 of ISO TC135 Subcommittee 7 is stimulating considerable discussion as it proposes to dispense with traditional ISO 9712 type programmes, substituting demonstration of competence as the sole factor in determining qualification of personnel. This activity challenges the industry to examine current training schemes, both class-room and on-the-job, and to consider the impact of such a move on the levels of qualification and assignment of service company personnel.

Introduction: Performance demonstration has been discussed publicly at technical conferences and privately between vendors and clients for more than a decade. Most of the discussion has related to the particularly stringent requirements of the nuclear industry which has had to react to some serious negative experiences.

In 2000, ISO TC135 Subcommittee 7, (NDT/Personnel Qualification), was asked to establish a Working Group to consider a radical new approach to the general concept of personnel qualification, one which would base certification on proof of competence through performance demonstration, either in addition to, or instead of, certification through the more traditional route of formal training plus documented experience plus written and practical examination.

While such a change has some obvious merits, it also has a substantial potential impact on some of the industry sectors to which it could apply. The inspection services industry has some particular issues which need to be considered in any discussion around this topic, not the least of which are the economic and operational considerations when performance demonstration is applied to a multitude of industrial applications and to personnel whose “industry sector” can change perhaps several times during one work-day.

Lessons from History: As the technology of non-destructive testing has developed, we have placed considerable emphasis on the precision of the instrumentation, the resolution of adjacent discontinuities and the accuracy of location. To make best use of advanced materials under increasingly demanding applications, this type of detail is essential. Engineers and physicists can predict performance much better if they can make unequivocal assumptions about the size and orientation of discontinuities that exist.

In any non-destructive test system, the most difficult component to quantify is the human operator, and thus we have spent many millions of dollars in development of qualification and certification programmes, all of which seek to provide us with a better handle on the human factor.

The principles embodied in ISO 9712, EN 473, SNT-TC-1A and many other national or regional certification schemes are common: on an assumed education base, add a defined amount number of hours of training, some dedicated practical experience, and top it off with a set of formal examinations. The result is a “qualified” NDT operator.

We have spent the last forty years fine tuning this process—using examination performance experience to adjust training hours, using available technology to make the examination process more efficient and relying on easily marked multiple choice examinations to provide objective assessment.

Lessons from teaching: Learning is an individual action. Each of us learns in his own way and at his own speed. For some, theory is easy to grasp but difficult to translate into action. For others, manual skills are easy, but the theoretical basis remains a mystery. For many of our older technicians, the multiple choice examination is still a fearsome entity. Some trainers argue that, while this type of examination can be computer graded or easily marked with a template, it does not provide the insight into the technician’s work methods and adaptability that the written examination can show.

Practical examinations are somewhat more probing, however the trend again is to have the candidate show his capability to demonstrate his skill on a simple application which can be easily and uniformly graded and which may or may not be relevant or applicable to his industry.

We have learned that the formal qualification systems are simply screening system; the certified individual must be further tested on his ability to perform a job specific examination. We do this as a matter of practice in our industry on employing an individual for the first time, or before assigning him to a particularly challenging inspection. We are witnessing a trend for clients to require demonstration of performance even if the code or industry practice does not require it. While it is widely known that this is true in the nuclear industry, it also applies to the petroleum industry, to the aircraft industry, and to the transportation industry.

Time for Another Look: The practical examination which forms part of the 9712-type of certification examination tests the ability of the candidate to perform, however, the number of specimens is limited and either too narrowly focused (for a sector examination) or too widely focused (for a common general application type sector). Much stress has been put upon the required practical experience but the focus here is often on setting a minimum requirement to ensure that the individual is able to succeed in his practical examination. Very seldom is the practical experience required to be structured either to the method or to the individual. In fact, most certification schemes permit reduction of the experience requirement in one method if the candidate is simultaneously gaining experience in other methods.

The concept of a performance demonstration examination for every application has great appeal, but may be too expensive. An examination in which the candidate achieves a percentage of success in detecting a number of flaws can produce a reliability number which can be defined as a percentage. This operator reliability, when coupled with other system factors, can be extended to provide a system reliability, and perhaps, a level of comfort to those who rely on the results of the examination.

Concerns from the Inspection Service Sector: The inspection service industry is client driven, with personnel certification a factor in specifications, contracts, and industry standards. Compliance with one or more certification schemes is enforced by client visits, third party inspection or jurisdictional audits.

The nature of the business is such that there is seldom opportunity to dedicate technicians to specific methods or product categories or industry sectors. The inspector is expected to be able to competently inspect nuclear piping today and aircraft forgings tomorrow. He may be checking thickness of boiler tubes one day and inspecting structural welds the next.

Most current test assignments are system based (not methods based) and the inspector will be dispatched to inspect an above ground storage tank using magnetic flux leakage for the floor, followed by ultrasonic prove-up of any indications, magnetic particle inspection of floor joints and overall visual inspection. He may be inspecting a mobile crane where his overall visual inspection is supplemented by magnetic particle inspection of welds and critical areas of the structure and ultrasonic inspection of pins and bolts.

Product or industrial sector based certification systems do not work in this scenario. To comply with such systems, the individual would have to qualify in every category or sector to which he might be exposed. The certification system's response to this concern is to provide a general category which by definition is less intensive in any of the specific areas—the result is a generalist technician who is acknowledged to be less than an expert.

Of particular concern to the service industry is the potential for another level of qualification which is dedicated to a single industry, is expensive to obtain and which does not improve the general quality of the inspection provided.

It is recognized that there are differences in degrees of risk, determined by the consequences of failure and the likelihood of failure, and that this risk determines the level of inspection and consequently the competence of the inspector. As an employer and as a purveyor of inspection

services, how do we handle a selection of technicians who each have achieved a different level of reliability? Do we offer the client a 50% technician or a 75% technician, and if we give him that choice, do we tie our billing rate to his reliability number?

Conclusion: Performance based certification can improve our personnel qualification systems by recognizing individual capacities, limitations and needs. These qualities can be measured or otherwise defined with more accuracy today than 40 years ago. If this approach results in a system that is portable, employer to employer, industry sector to industry sector, and applies to more than the nuclear industry, it will represent a significant move forward.

Recognizing the individual, providing training at the rate and level which is appropriate for him, using learning technologies which are available today, with structured practical experience, and delivery at reasonable cost are the key considerations as we develop a “revolutionary” approach to personnel qualification and certification.

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The title of his presentation differs from that in the program—he will be presenting "**Performance Based Certification—a Service Industry Perspective**", some comments that are meant to provide us with additional content for our discussions as we go forward from here.