

ELECTROMAGNETIC STANDARDS AT THE NATIONAL LEVEL: TECHNOLOGICAL AND MARKET TRENDS

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Introduction

In common with so many aspects of the technological, industrial and economic scene, the measurement industry is undergoing considerable changes. This paper discusses some of those changes, as viewed from NPL, a national standards laboratory which plays a strong role at the international level. This is inevitably an introspective view, but one which does have some impact for the broader UK measurement community.

Some may immediately assume that a paper of this sort is prompted by the recent change in the operational management arrangements for NPL, but this is not so. NPL's ability to respond positively to the changing world of metrology has been improved by its recent transition to private-sector management, but the main issues are quite independent of this.

Coping with changing needs

NPL has an excellent record among the world's National Measurement Institutes (NMIs) in responding to and anticipating the changing national technological needs in measurement standards and techniques. Certainly the pressures, mainly economic, on NPL and its main customer for measurement standards development, the DTI, have been such as to focus ever more tightly on priorities and the identifiable national benefits for each part of the standards work.

Traditionally, NMIs, perhaps including NPL, have been regarded as somewhat isolated and protected from commercial pressures, and intent on following their own rather than their customers' and stakeholders' agendas. It is usually accepted that NMIs such as NPL must remain somewhat outside the commercial mainstream in order to perform their role properly. But on the other hand, we at NPL can only perform that role if we are closely responsive to the changes, both technological and otherwise, in that mainstream. Moreover, we have no choice in the matter: NPL, despite its singular position in the UK, is increasingly part of a market-place, with all that that implies.

What 'market' is NPL in?

As you will appreciate, the measurement market-place is becoming both more structured as well as more competitive. Some of the key factors are:

- i) The growth of formal quality systems with requirements to demonstrate measurement traceability.
- ii) The spread of certification to ISO 9000 series standards and accreditation of measurement and test capabilities to ISO Guide 25 standards, with a requirement for formal records of calibration.

- iii) The globalisation of trade in instrumentation, and measurement and testing services, with implications for international acceptability of standards and measurement practices.
- iv) The growth of multi-national companies for whom the concept of 'national' measurement standards may become an irrelevance or an undesirable barrier.
- v) In Europe, the development of statutory directives with metrological implications where there is a demand for agreed common methods to exhibit compliance.
- vi) A growing acceptance that even the leading economic nations may not be able to maintain comprehensive leading-edge metrological capabilities, and may defer to others for highest-level traceability. (On the other hand, many of the emerging economies give increasing priority to developing greater national high-level metrological capability.)
- vii) The still relatively small, but growing impact of regional cooperation between NMIs, of which EUROMET, NORAMET (in North And Central America) and the Asia-Pacific Metrology Programme are examples. These are a focus for collaboration and cooperation, with the potential for inducing more uniform and unified regional measurement systems.
- viii) Varying national perceptions of the strategic and economic value of maintaining leading-edge metrological capabilities with public funding.

Against this background, NPL, very broadly speaking, serves two types of customers for measurement standards and calibrations:

- a) Those who require to demonstrate traceability, nationally and internationally, but not necessarily either to world-leading accuracy or in uncharted measurement territory.
- b) Those who require the 'best' available, because their own products' competitiveness depends crucially on it.

For the first type of customer, we begin to see the first signs at NPL of a market feature already existing at lower levels of the NMS hierarchy i.e. customer demand for a well-specified commodity product (a traceability-proving certificate) at a competitive price in a business-efficient service package. Of course, such a customer demand can only be truly satisfied when there is a choice of supplier. In practice, this can be achieved if the customer is prepared to shop internationally for his 'national-level, internationally-accepted' standards. 'Shopping around' at NMI level is still a very limited phenomenon, but one we can expect to see increase, particularly in Europe. However, because a key feature of a calibration service is often the accompanying technical advice, the 'home' NMI is still the obvious choice for most customers.

The second type of customer constantly stretches an NMI's capabilities and is the strongest source of pressure for new standards developments.

Market Drivers

Both types of customer described above are very important to NPL. The first is the basis for sustaining a wide range of metrological expertise which is virtually essential for a credible world-class centre in this area. The second group has a large effect on priorities for technological developments, and hence shapes the evolving spectrum of outstanding technical strengths at NPL.

The main technical drivers for this second group include:

New requirements produced by EC Directives or other specification standards, sometimes where the technical specification for measurement methods is immature.

New or improved instruments requiring traceability to meet

- new measurement parameters
- extended frequency ranges
- higher dynamic ranges
- more intensive standards coverage within existing parameter ranges
- higher accuracy.

Exploitation of re-allocated or previously under-utilised frequency bands, for civil and military purposes.

Health and safety, particularly concerning e.m. radiation levels in both continuous and pulsed mode, and in differing e.m. environments.

Engineering refinement in new technologies where quality control demands tighter specification and control, often introducing new measurement parameters.

Moves towards digital operation in many systems, demanding time-domain or broadbanded measurement rather than discrete frequency data.

Examples of these and how they impact on standards and traceability will be given in the presented paper.

Conclusion

Despite being constituted as a national laboratory, NPL moves in a complex environment reflecting not just its immediate responsibilities to the UK, but also increasing global market pressures. In electromagnetic technology as elsewhere, NPL must ensure it impacts on, and responds to, the UK's industrial and other needs as optimally as possible. To bring that off, NPL's ongoing dialogue with all concerned must become even more intensive than in the past.