

Doosan Babcock

Nuclear NDT from a Vendor's Perspective

John Allen

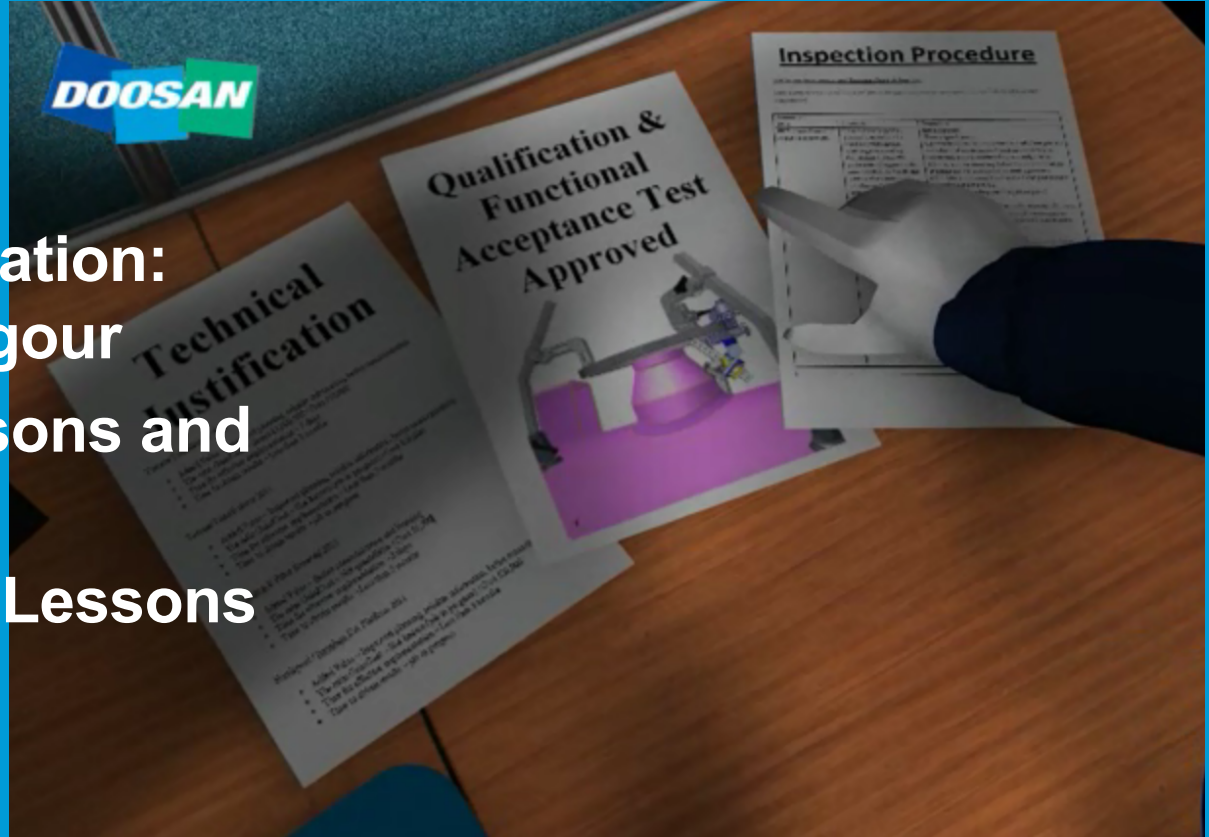
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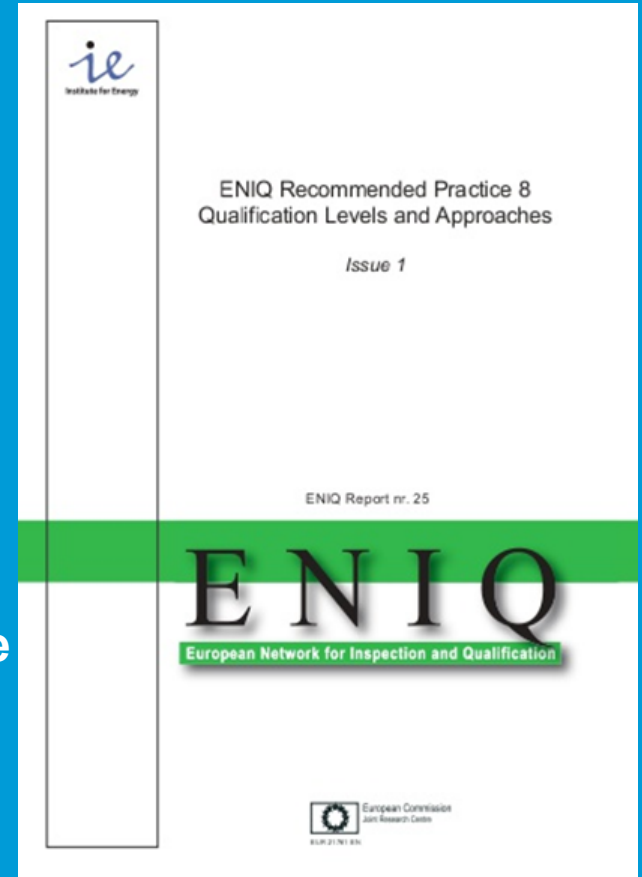
Contents

- ENIQ
- Inspection Application: Validation and Rigour
- Insight: Comparisons and Examples
- Conclusions and Lessons Learned



ENIQ Approach

- European Network of Inspection and Qualification
- Provides a thorough methodology for the development and application of a quality inspection
- A quality inspection being one which has an optimised probability of detecting and characterising the defects postulated when applied at the time of development or during the lifecycle of the component



Validation and Appropriate Rigour

- Any methodology is only as effective as its application

Requires:

- Independent Validation (or 3rd party)
- Strong client understanding of their plant and methods of component identification
- Robust review and approval process
- A will and means for enabling improvement
- Although the ENIQ approach may be applied widely it is executed in very different ways in combination with different regulations, codes, standards and geographies

The image shows a 'Technical Report' form from Doosan Babcock. The form includes a header with the company logo and name, followed by the title 'Technical Report'. Below this is a section for 'TECHNICAL JUSTIFICATION' with a signature line for 'J Allen'. A series of fields for project details are listed: Project Title, Project No., Report No., Date, Customer, Customer Report No., and GPS No. At the bottom, there is a 'CONFIDENTIAL' stamp and a 'Final Report' stamp. A small disclaimer and reference number are at the very bottom.

Example Comparison UK and France

- **Different Plant**

UK

- Slightly less formal & pragmatic approach to inspection requirements
- Less documentation
- Closer involvement from customer, regulator and vendor
- ASME based code (SZB)
- Different requirements for AGRs and SZB
- Greater flexibility incorporated into the procedure

FRANCE

- *Slightly more contractual, process driven, greater emphasis on detail*
- *Tight specification of requirements and deliverables*
- *Fleet-wide or Type-wide contract*
- *RCCM & RSEM Code*
- *More scope to incorporate vendor's methodology during the development stage*

In common, both look beyond the inspection design and for the longer term

- Continued investment in future-proofing personnel and equipment Training, Retesting, Validation, Spares and Development

Nuclear Comparisons with other Sectors

Generally

- Far greater level of inspection quality, reliability & consistency than in other sectors
- More comprehensive training of personnel
- Strongly compelled to perform inspections by regulation and extensive standards
- Invest greatly in component specific inspection to optimise performance

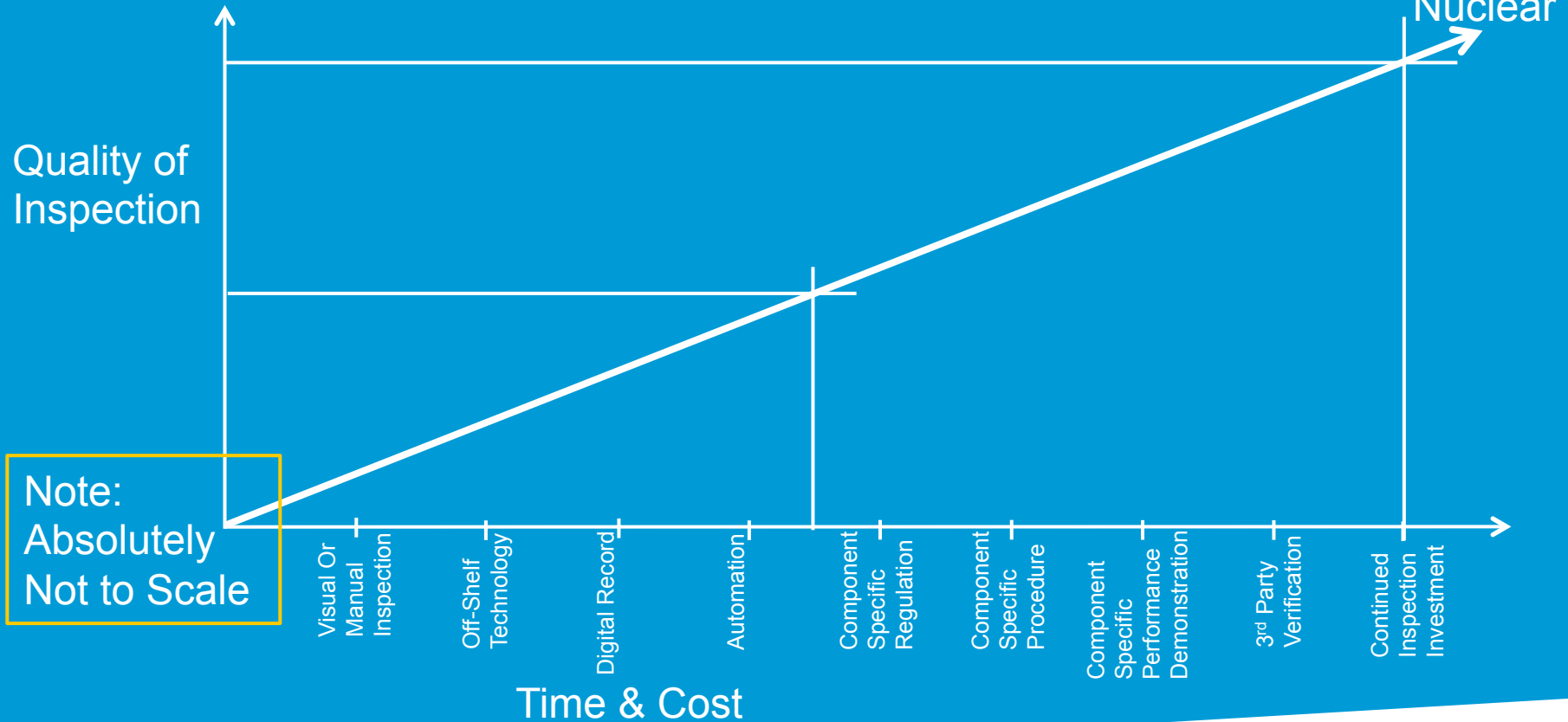
However

- Slow to adopt changes in processes, techniques and technology
- Level of documentation can become difficult to manage and occasionally distract from the inspection
- Occasionally too much emphasis on details with limited impact on the inspection quality

Sectors

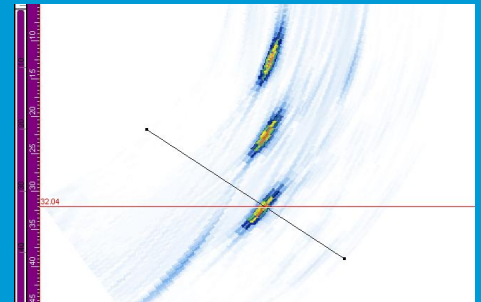
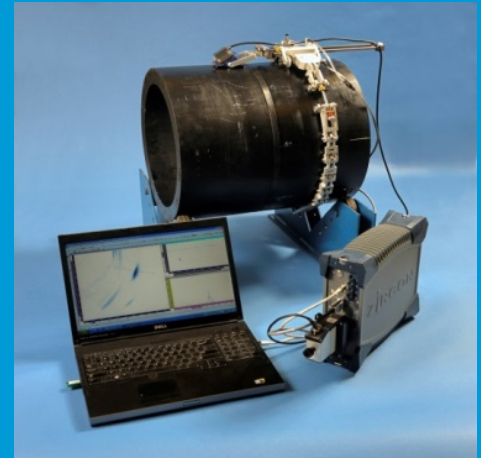
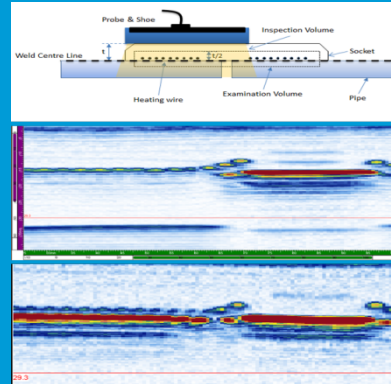
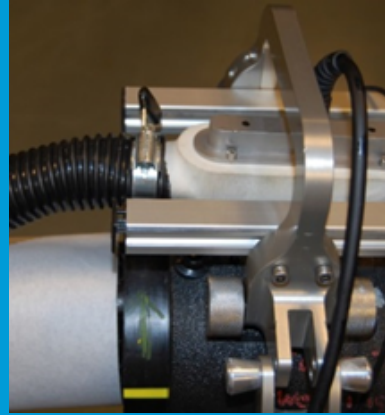
- Nuclear
- Oil & Gas
- Thermal
- Process
- Water Infrastructure

Inspection Quality Factors



Example: HDPE Components

- Has been used and inspected on UK nuclear sites for over 10 years
- Now starting to be deployed on French NPP with inspections
- Has been used across gas network for decades with only limited (Visual, limited standards) inspection
- Now being widely deployed in process sector with very limited inspection
- Water infrastructure for decades



Example: Use of Eddy Current Array

- Has recently started being used for inspection on UK nuclear sites and is likely to be adopted more broadly for outer surface inspections
- Deployed on French NPP for Steam Generator inspections
- Process sector is very receptive of potential benefits and technique can potentially be implemented almost immediately



To Conclude (our lessons learned)

Spare a thought for the vendors

- Customers almost never want exactly the same thing
- Exacting standards to be met – but not always in the same way
- Inspection vendors have difficult balancing act both technically and commercially
- Investment vs Commercialisation difficult
- Methodology for inspection in nuclear is very thorough and is very effective in minimising risk in comparison to other sectors
- In certain circumstances within the Nuclear sector, the rigidity of the inspection process and the documentation culture can distract from the inspection