PREDICTIVE MAINTENANCE WHITE PAPER

Noria has published a white paper titled "Five Reasons Predictive Maintenance Programs Fail When Evolving into Industry 4.0," sponsored by AssetWatch. When appropriately implemented, predictive maintenance programs save time and money by increasing efficiency and limiting machine downtime and failure. Some plants have trouble implementing predictive maintenance properly; other plants have had good predictive maintenance programs for years but are suddenly struggling. Why is this?

These facilities are struggling because they're finding it nearly impossible to adapt to technological advancements. They face a difficult choice: keep doing things the old way while competitors progress or attempt to integrate Industry 4.0 practices. The choice seems obvious—we should evolve into Industry 4.0. But, if done incorrectly, this integration can make processes less efficient than ever before.

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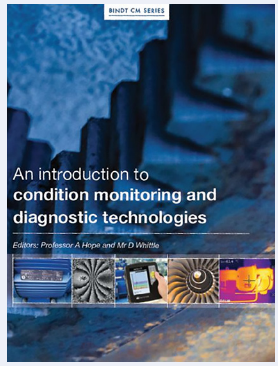
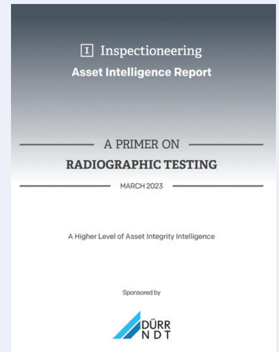
CONDITION MONITORING BOOK



BINDT (British Institute of Non-Destructive Testing) has published *An Introduction to Condition Monitoring and Diagnostic Technologies*, edited by A. Hope and D. Whittle. This book covers all aspects of condition monitoring from an introductory level and provides a general introduction to condition monitoring and diagnostic technologies, containing eleven chapters on the following topics: implementing condition-based maintenance; vibration analysis; oil analysis; wear debris analysis; acoustic emission; thermal imaging; ultrasound condition monitoring; motor current signature analysis/electrical condition monitoring; optical condition monitoring and laser shearography; prognostics and root cause failure analysis; and ISO standards.

BINDT.ORG

RADIOGRAPHIC TESTING REPORT



Inspectioneering has published an Asset Intelligence Report titled *A Primer on Radiographic Testing*, sponsored by DÜRR NDT. Radiographic testing (RT) is commonly used as a volumetric nondestructive examination (NDE) technique in the hydrocarbon and petrochemical industries to view or inspect equipment, such as pressure vessels, valves, and welded joints. This report serves as an informative primer to provide an understanding of RT. As with other Asset Intelligence Reports, this document is not intended to serve as a comprehensive guide, but rather an introductory primer on RT.

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NDE OUTLOOK FROM P. 19

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ASNT CERTIFICATION SERVICES SEEKING PARTNERSHIPS WITH EQUIPMENT VENDORS

ASNT Certification Services LLC (ASNT CS) has opened a new 9000 ft^2 state-of-the-art training and testing facility in Houston, Texas, and is actively looking for a few more nondestructive testing (NDT) equipment and product vendors to partner with to equip the new facility.

These partnerships would allow ASNT CS to use the vendor's NDT products and equipment for training and testing while ensuring that vendors receive company and product exposure and promotion, as well as additional negotiated benefits. Following is a high-level overview of some of the types of NDT products and equipment needed to equip the Houston training facility. If your company would like to review the complete equipment list, please email certification@asnt.org.

Electromagnetic Testing:

- Surface testing equipment and probes

Magnetic Particle Testing:

- MT bench and accessories
- MT yoke and accessories
- Consumables

Liquid Penetrant Testing:

- PT line and accessories (all techniques)
- Consumables

Radiographic Testing:

- X-ray cabinet (fully locked and alarmed) and accessories
- Consumables

Ultrasonic Testing:

- UT thickness equipment and accessories
- UT shear wave equipment and accessories
- UT phased array equipment and accessories
- Consumables

Visual Testing:

- Remote visual video equipment
- Direct visual measurement devices

General:

- Reference standards
- Flawed samples
- Promotional materials

STANDARDIZATION IN ARTIFICIAL INTELLIGENCE: NEEDS, POSSIBILITIES, AND CHALLENGES

Artificial intelligence (AI) and machine learning (ML) techniques and their applications are flourishing in a variety of areas including health and medicine, engineering, manufacturing, and nondestructive testing (NDT). Many industries, companies, and government agencies invest enormously in research on AI; for example, €20 billion (US$21.5 billion) per year to the end of 2020 was invested by the European Union alone on AI research and development[1]. The US National Science Foundation announced US$140 million in funding in May 2023 to launch seven new National AI Research Institutes. This investment will bring the total number of institutes to 25 across the country and extend the network of organizations involved into nearly every state[2].

Standardization of a technique or a method is the key step toward generalization of its application. In addition, standardization has a significant positive impact on technology transfer and emerging technologies by forming common vocabularies and agreed definitions of terms.

However, in the case of AI, and specifically in the field of NDT, the question is that if AI research has already produced mature technologies, and if AI-NDT is ready for standardization. There have been numerous articles published in AI for the NDT domain in the last few years, but practical assessment of the proposed AI methods is limited due to the lack of standardized practices that can be used to validate the performance of the developed tools. From a scientific point of view, there are many open research questions that make AI standardization appear to be premature. As an example, many existing standards in the field of inspection and safety, such as ISO 26262 on functional safety of road vehicles, are not compatible with typical AI methods despite the increasing efforts and interest in advancing technology in passenger cars and autonomous vehicles[3].

Currently, many standards development organizations worldwide work on norms for AI technologies and AI-related processes.

The International Organization for Standardization (ISO) has run a standardization project on AI since 2018. ISO, in collaboration with International Electrotechnical Commission (IEC), founded the subcommittee ISO/IEC JTC 1/SC 42 to work on an AI standardization project[4]. The scope of work of subcommittee 42 is standardization in the area of AI and consists of five working groups (WGs) and a joint working group with subcommittee 40 (IT Service Management and IT Governance). The WGs include foundational standards (WG 1); big data (WG 2), which used to be covered by a separate working group under JTC 1; trustworthiness (WG 3); use cases and applications (WG 4); and computational approaches and computational characteristics of AI systems (WG 5). Societal concerns have become a subtopic of WG 3. A brief description of each WG follows:

- WG 1 attempts to find a workable definition by consensus. Although the concrete wording of the AI definition may not be highly crucial for the quality of the future SC 42 standards, there is a definite need for an AI definition in industry.
- WG 2 is assigned to work on big data.
- WG 3 works on trustworthiness, including the main tasks of (a) investigating approaches to establish trust in AI systems through transparency, verifiability, explainability, and controllability; (b) investigating engineering pitfalls and assess typical associated threats and risks to AI systems with their mitigation techniques and methods; and (c) investigating approaches to achieve AI systems' robustness, resiliency, reliability, accuracy, safety, security, and privacy.
- WG 4 works on use cases and applications with the main tasks of (a) identifying different AI application domains and the different context of their use; (b) describing applications and use cases using the terminology and concepts defined in ISO/IEC 22989 and ISO/IEC 23053 and extending the terms as necessary; and (c) collecting and identifying societal concerns related to the collected use cases.
- WG 5 works on computational approaches and computational characteristics of AI systems including (a) main computational characteristics of AI systems and (b) main algorithms and approaches used in AI systems.

More updates on the progress of AI standardization will be discussed in future articles as they become available.

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