

The ROLE and CHALLENGES of NDE 4.0 in ASSET & PROCESS INTEGRITY MONITORING

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Asset Integrity and Process Monitoring technologies have a logical impact on operational costs. Efficiencies realized by effectively managing labor, inventory and other support services directly impact the bottom line by helping to control costs. More timely and precise user intervention can improve productivity, reduce materials use and decrease the cost of doing business. The emergence of NDE 4.0, that was an outcome of the emergence of industry 4.0 as a precursor, proposes to change the way we do NDE over the next few years. Here, in NDE 4.0 several technologies including robotic inspection, big data analytics, AI based decision making are under development. Here, the decisions are made based on rules that were derived using experiences and calculations that were done off-line. The future will be driven by the NDE 4.0 paradigm will be implicitly based on complex calculations performed in real time in a ubiquitous and pervasive manner. Here, the computation will assume the form of ubiquitous computing that will lead to decisions that are driven by real time evaluation of the cause-effect scenarios as the inspection is taking place. This includes replacement of the AI Trained engines with simulation based Trained Engines and decision and interventions based on the decisions driven by AI trained computational engines. For instance, can we have online NDE calculations, driven by AI engines, that can evaluate different "what-if" scenarios and provide an automated recommendation to the operator and managers on the cause and remedy for a particular inspection problem. Additionally, there are several other challenges that need to be overcome in order for the NDE 4.0 to be accepted by the industry. This includes dealing with the development of codes and standards that are NDE 4.0 compliant. The issue of ethics, data security, data integrity, empathy, etc. will have to be addressed and a common ground for discussion and convergence will be required to a global deployment of NDE 4.0 technologies.