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Risk Based Inspection and Proactive Maintenance for Civil and Structural Assets in Oil and Gas Plants

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Abstract : Civil and structural assets normally have an average of more than 30 years of design life. Adding to this advantage, the assets are normally subjected to slow degradation process. Due to the fact that repair and strengthening work for these assets are normally not dependent on plant shut down, the maintenance and integrity restoration of these assets are mostly done based on “as required” and “run to failure” basis. However unlike other industries, the exposure in oil and gas environment is harsher as the result of corrosive soil and groundwater, chemical spill, frequent wetting and drying, icing and de-icing, steam and heat, etc. Due to this type of exposure and the increasing level of structural defects and rectification in line with the increasing age of plants, assets integrity assessment requires a more defined scope and procedures that needs to be based on risk and assets criticality. This leads to the establishment of risk based inspection and proactive maintenance procedure for civil and structural assets. To date there is hardly any procedure and guideline as far as integrity assessment and systematic inspection and maintenance of civil and structural assets (onshore) are concerned. Group Technical Solutions has developed a procedure and guideline that takes into consideration credible failure scenario, assets risk and criticality from process safety and structural engineering perspective, structural importance, modeling and analysis among others. Detailed inspection that includes destructive and non-destructive tests (DT & NDT) and structural monitoring is also being performed to quantify defects, assess severity and impact on integrity as well as identify the timeline for integrity restoration. Each defect and its credible failure scenario is assessed against the risk on people, environment, reputation and production loss. This technical paper is intended to share on the established procedure and guideline and their execution in oil & gas plants. In line with the overall roadmap, the procedure and guideline will form part of specialized solutions to increase production and to meet the “Operational Excellence” target while extending service life of civil and structural assets. As the result of implementation, the management of civil and structural assets is now more systematically done and the “fire-fighting” mode of maintenance is being gradually phased out and replaced by a proactive and preventive approach. This technical paper will also set the criteria and pose the challenge to the industry for innovative repair and strengthening methods for civil & structural assets in oil & gas environment, in line with safety, constructability and continuous modification and revamp of plant facilities to meet production demand.

Keywords : assets criticality, credible failure scenario, proactive and preventive maintenance, risk based inspection
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