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Risk informed inspection and maintenance in refineries

Safety and reliability of industrial equipment in the process industries are substantially influenced by degradation processes such as corrosion, erosion, deposits and blocking of pipes. To that end Risk-Based Inspection and Maintenance (RBIM) methodologies are progressively adopted using prediction models that depict the yearly corrosion rate of piping & equipment groups.

Indeed, piping and equipment corrosion can trigger serious failures, which eventually lead to large economic loss, sometimes combined with environmental pollution or personnel losses, together with unpredictable and costly shutdowns of industrial facilities owing to repair and /or replacement. Additionally, the increasing importance of Hydrogen (H₂) as an alternative marine fuel makes the study of its handling very topical right now.

The analysis described in this work is performed in a Hydrogen (H₂) steam-reforming unit of a Greek refinery for its diesel desulphurization process, under different operating conditions; namely temperature, pressure, fluid speed, metallurgy and more related physicochemical variables that have been gathered in a file. Wall thinning measurements by ultrasonic scanning equipment performed by the refinery personnel were grouped by period, unit section, steel alloy type, fluid type, and nature; the latter have been processed by multivariable regression analyses.

The outcome of these analyses is an extensive family of multivariable functions describing, with a predefined accuracy, the yearly corrosion rate for each corrosion loop and for each examined part of it. This analysis provided the basis for the design and development of a tailor-made software with user-friendly data entry and reporting system to be used as an additional loss prevention tool by the refinery management team. An overview of the results regarding the tool implementation will be presented.

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