STRATEGIES AND SCENARIOS REGARDING THE ENGINEERING AND MANAGEMENT OF DIAGNOSIS, MAINTENANCE AND RELIABILITY OF OIL PIPELINES

PhD Candidate   PhD Coordinator
Dipl. Eng. Ion Răican   **Univ. Prof. Dr. Eng. Alecsandru Pavel**

ABSTRACT

The main objectives of the doctoral thesis entitled "**Strategies and Scenarios regarding the Engineering and Management of Diagnosis, Maintenance and Reliability of Oil Pipelines**" were first the study, the engineering research, the selection and the management application of the most appropriate diagnostic and maintenance methods for oil pipelines, so that to ensure a high level of reliability and second, the structural integrity assessment of domestic oil pipelines presenting metal loss imperfections and defects or deviation from circularity.

In *the first chapter* of the thesis, entitled "**Introduction**" are presented the nominal and characteristic quantities of oil pipelines, the main factors that determine the behavior under load of oil pipelines materials and the materials used for manufacture, the factors and processes leading to degradation of oil pipelines and appearance of anomalies (imperfections and defects) and also the categories and criteria for classification of typical oil pipelines imperfections and defects, like local deformation, cracks or metal loss.

In *the second chapter* of the thesis, entitled "**Strategies and Scenarios for In Situ Monitoring and Technical/Technological Diagnosis of Oil Pipelines**" are presented and analysed the modern methods, procedures and means of diagnostic techniques used for oil pipelines imperfections and defects investigation, detection and identification, with emphasis on non-destructive control type, under continuous in situ monitoring of specific operation parameters.

In *the third chapter* of the thesis, with the title "**Strategies and Scenarios regarding the Maintenance, the Technical/Technological Security and the Reliability of Oil Pipelines**" are analysed, commented and interpreted various types of maintenance systems used for oil pipelines, resulting in the strategies application of maintenance operations based on possible scenarios, in order to ensure high levels of technical security and reliability in operation.

In *the fourth chapter* of the thesis, entitled "**Strategies and Scenarios regarding the Engineering and Integrity Management of Oil Pipelines**" are highlighted the potential hazards that could affect the integrity of oil pipelines, the methods for their assessment/mitigation and the establishing of optimal range between assessments for each hazard group separately. There are also analysed the oil pipelines induced hazards and are presented the relative risk assessment for a domestic oil pipeline, using Longhorn methodology, based on measuring the probability of failure for all the failure modes.

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The fifth chapter of the thesis, with the title "**Implementation of an Exemplification Informatics Analyse regarding the Industrial Technological Processing of the Domestic Oil Pipelines**" includes analysis of all unprovoked and provoked damages occurred in the period between 2000 and 2008 years to a domestic oil pipeline, according to various parameters, based on entries in the Oil Pipeline Record Sheet, and the interpretation of results.

The scope of *chapter six* of the thesis was to perform a "**Comparative Technical Study of a Domestic Oil Pipeline System Assessment, based on In-Line Inspection Results**". The two in-line inspections performed at an interval of ten years, by different companies, on the same system of oil pipelines were analysed in corelation with the evolution of dimension values defects detected and of calculated values for safe operating pressure.

In *chapter seven* of the thesis, entitled "**Evaluation of Structural Integrity of the Studied Oil Pipelines, in compliance with ASME B31G Standard**" are presented the operational methodologies for the maximum operating pressure, the bursting pressure and the estimated rehabilitation factor and also the identification of critical defects, based on the in line 2008 year inspection of the domestic oil pipeline system.

In *chapter eight* of the thesis, entitled "**Evaluation of Structural Integrity of the Studied Oil Pipelines, in compliance with API 579**" are presented the Fitness For Service procedures used in 1, 2 and 3 level assessments of the oil pipelines with metal loss defects of general and local type or deviation from the geometric form type, with applications to studied domestic oil pipelines. There are also presented the graphical interfaces for the new-created informatics product and software, **conpet4** and the comparative analyse of a section of a domestic oil pipeline, in compliance with ASME B31G standard and API 579 standard.

In *chapter nine* of the thesis, entitled "**Experimental Determination of Structural Integrity Assessment of Oil Pipelines with metal loss discontinuities**" are presented and analysed the following aspects: the construction and functional features of the existing experimetal research stands for the mechanical behavior of pipes with and without anomalies on the tubing and designing an experimental program for determining the bursting pressure of the pipes with metal loss anomalies.

Chapter ten of the thesis includes "**General conclusions. Contributions. Improvements. Claims**" which the author has emerged from the analysis of scientific problems offered by the doctoral thesis.

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