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Analysis of Risk-Based Inspection (RBI) and Reliability-Centred Maintenance (RCM)

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Abstract: *Pipe systems in petroleum and gas industries as well as in process industries are subjected to harsh mechanical, thermal and environmental conditions. The pipeline's failure may cause serious accidents like fire, explosion, and environmental problems over a long period, which evokes the necessity of organized Pipeline Integrity Management (PIM) activities. The chosen paper is the extensive review of the maintenance and integrity management strategies in the O&G piping systems with a specific emphasis on the Risk-Based Inspection (RBI) and Reliability-Centered Maintenance (RCM). It talks about piping stress analysis as a basic necessity of providing structural integrity in both the static, and dynamic loading conditions with the aid of advanced engineering software like the CAESAR II and AutoPIPE. The paper also gives the RCM framework of determining functional failures, failure modes and suitable maintenance activities as well as the RBI method of determining the likelihood of failure and effects of failure to prioritize the inspection activities. Comparative analysis has shown that RBI is inspection-based and efficient in dealing with high-risk and corrosion-prone piping systems whereas RCM is a function-based and improves the overall system reliability by optimized maintenance planning. The article concludes that optimising oil and gas pipeline safety, dependability, and cost-effectiveness through the integration of RBI and RCM is a powerful and complementary strategy.*

Keywords*:* Risk- Based inspection, Piping System, Reliability Centred Maintenance, Piping Techniques, Piping System Analysis

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