

# MANAGING DAMAGE MECHANISMS: A CRADLE TO GRAVE JOURNEY

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**Abstract.** Fixed equipment and associated components in oil and gas facilities are designed, installed and operated within oil and gas industry are subjected to various types Damage Mechanisms throughout the facilities operating life cycles. The success of managing Damage Mechanisms affecting these equipment and components are primarily influenced by critical decisions made at various stages of equipment life cycle from the design, construction, operations until decommissioning of the assets and specific equipment. The industry is facing depleting reserve in which easy to access hydrocarbon resources days becoming a distant past, there is a pressing need to implement cost compression measures at various stages of the asset life cycle necessitate a fit-for purpose (FFP) approach to Damage Mechanisms management. This paper will discuss various measure taken to manage Damage Mechanisms at critical stages of oil and gas facilities life cycle with the aim to meet asset performance objectives while keeping the cost & safety targets attainable by implementation of FFP materials selection, Quality Management System at the Design and Construction Stages, implementation of Risk Based Inspection and deployment of advance technology to predict, detect and measure active Damage Mechanisms at operational stage. Extension of asset useful life through Asset Life Extension Study (ALES) and implementation of FFP inspection, testing and maintenance program by demonstrating operational risk are at As Low As Reasonably Practical (ALARP) by keeping all active Damage Mechanisms are well within expected limits will assure business targets are met without compromising Health, Safety and Environmental (HSE) objectives.



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**Short Bio:** Ir. Hambali is currently the Group Technical Authority (G-TA) in Material, Corrosion & Inspection (MCI) GTS, PD& T PETRONAS. He has more than 25 years of experience in Asset Integrity & Material, Corrosion and Inspection (MCI) field, with key roles in the following key areas:

- Leading the development & deployment of PETRONAS Technical Standards (PTS) and PETRONAS Technical Guideline (PTG) for the purpose of Asset Integrity assurance & governance.
- Overseeing the development and deployment of PETRONAS-Risk Based Inspection (P-RBI) and Corrosion Management Program (CMP), Compliance to statutory regulations, Special Scheme Inspection (SSI) and evaluation and deployment of Inspection & NDT technology.
- Lead numerous major Asset Integrity & HSE failures incidents investigations throughout his career. Review, appraise and endorse asset integrity Root Cause Failure Analysis (RCFA) group wide.
- Lead the Development and implementation of SKG 15 Skill Group Capability Development through development and continuous enhancement of SKG Competency Development Technology Inventory Descriptors and Rulers (TI&R), conduct competency assessments, coaching, mentoring of Technical Professional (TP) candidates within PETRONAS TPCP Scheme, conduct competency assessment for Technical Managers (TMCA), coaching and mentoring of engineers and senior engineers within Accelerated Competency Development program (ACD).
- Lead the development and implementation of PRBI Expert Users and Practitioners Certifications Scheme for MCI Engineers
- Overseeing the development and deployment of Technical Trade Specialist (TTS) for Storage Tank