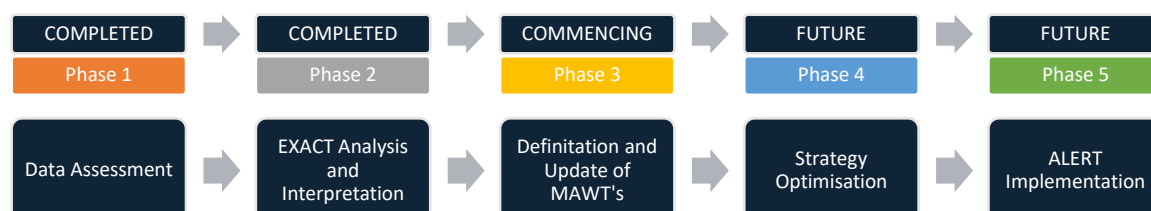


Case Study Overview: Late life Optimisation for Pressure Systems – International Operator 2023

Objective: An international Operator approached Imrandd to develop optimised late life strategies for pressure systems on its North Sea assets. Imrandd was tasked to carry out analysis of integrity and inspection data to create late life management plans to reach COP safely and in the most cost-effective way possible.

Scope of work: The focus of the late life optimisation followed Imrandd's "data driven" approach to maximise use of the existing historical data, to identify equipment where inspection requirements could be removed or modified before COP. This combined with Imrandd's engineering and technological capabilities provided clear insight and justification for a revised late life strategy. The methodology included the following steps:

A Phased Approach:



Note: To date Imrandd have completed phase 1 and phase 2 and will commence phase 3 in Q3 2023.

Phase 1 – Data Assessment:

Imrandd were tasked with providing a thorough review of the available integrity and inspection data for pressure systems for three North Sea assets. Phase 1 assessment included an appraisal of data available, allocations for risk, probability of failure and integrity status, historical inspections and current planned intervals and dates.

Assessments were conducted on both internal & external damage mechanisms for piping and vessel components based on the following steps: –

- **Internal/External Inspection Data Extraction:** Data retrieval – Gathered inspection reports, including internal/external integrity assessment data.

- **Data Preparation:** Using Extract and semi-automated QA/QC processes format, cleanse and condition data provided by the client.
- **Determination of metrics:** Covering quantity and quality of data available
- **Provide Basis of Insights:** Preparation of relevant visualisations and summaries
- **Provide view on remaining life and possible revision of inspection intervals.** (Based on inspection data)

This phase is a key enabler to phase 2 as it intended to identify preliminary candidate circuits and vessels where there is a reasonable likelihood that current inspection requirement, before COP, can be removed through identification of potential “quick wins.”

Results:

- A high volume of data extraction was completed for 2 of the assets, in the first 2 columns (shown below)

	Asset 1	Asset 2	Asset 3
Years of Data	2002 to 2020 (18 years)	2001 to 2020 (19 years)	2007 to 2020 (14 years)
No. Test Points with data	27,404	23,319	1,934
No. Lines uploaded to EXACT	2,618	2,896	366
No. Circuits uploaded to EXACT	98	164	32

- A low volume of data extraction was completed for the third asset – task to be addressed during phase 2.
- The extraction process was able to support the identification of systems with the greatest opportunity for optimisation and further detailed analysis within phase 2.

Benefits:

- Optimisation and validation of step 1 through 4 based on the volume and quality of data extracted.
- Majority of vessels identified for “quick wins” in Phase 1 were not major safety critical vessels.
- Early quantifiable scalable savings and justification to proceed to phase 2.
- Output can be used to gain a view on items likely to be removed from inspection but final revision to plan should await results of additional detailed analysis.
- Continual checks and balances were provided to the client that **demonstrated estimated a 20 –30%, reduction in inspection scopes for phase 1.**

Phase 2 – EXACT Analysis and Interpretation:

During Phase 2, Imrandd deployed its proprietary analytics tool EXACT to accurately cleanse, correct and interpret the data.

- **EXACT Software:** Identified “good data” for trending, segregated extreme data (ED); data that: May pose an immediate integrity threat. May not; pose an immediate threat but required further investigation.
- Provide remaining lives of equipment and pipework.
- Identify circuits and equipment items where inspection intervals could be extended, or could be removed from future inspection requirements to COP.

Results:

- The extracted data (Phase 1 and 2 combined) was run through a series of conditioning steps to prepare an input file for Imrandd’s EXACT software.
- Phase 2 identified a substantial reduction in the number of corrosion circuits and items for inspection before the COP date. In addition to phase 2, Phase 3 is projected to provide yet further reductions.

Benefits:

- Detailed analysis has further optimised inspection scopes recommending **approximately 30–50% reduction across all three assets.**
- The results of this work and the recommendations arising are expected to realise considerable savings in inspection effort to COP and will provide the basis for further reduction during phase 3.
- The next step, phase 3 will define appropriate MAWT’s for use in the remaining life analysis which is projected to bring yet further optimisation and removal of inspections scope.