Vysus Group

Whitepaper

Six steps to managing the integrity of ageing assets

Introduction

As industrial plants and production platforms mature, a higher proportion of their assets fall into the ageing category. Ageing assets are not restricted to a geographical area or the oil and gas industry, with other industries such as the downstream sector and chemical industries being significantly impacted. Ageing assets account for more than 70% of world production across a range of industries[1]. In terms of exploration, the United Kingdom Continental Shelf (UKCS) consists of fixed and floating platforms where 50% have exceeded their originally anticipated service life[2].

The risks of ageing assets

Ageing assets present a number of risks to safety, the environment, economics and company reputation. The longer an asset remains out of service for repairs, the longer its impact on production. Asset reliability is therefore key to safety, production capability and profitability.

The challenge relating to reliability is exacerbated by a lack of maintenance records and operators who are familiar with obsolete technologies. Many organisations don't have systems to capture information about the assets and common failure models are therefore lost. Without this detailed asset history and an understanding of failure models, it may not be easy to predict future failures. Spare parts are more difficult to source and become obsolete, which could lead to production downtime. Loss of production directly impacts the profitability of an operation and therefore, its viability to continue.

Undoubtedly, the highest risk for mature assets is their potential to result in a catastrophic failure. A single incident resulting in injuries or severe environmental consequences can cause significant financial loss and a loss of public credibility. This type of incident could result in the premature closure of a viable production plant.

70%

Aging assets account for more than 70% of world production across a range of industries[1].

Ageing assets have the potential to add to both OPEX and CAPEX by requiring unplanned expenditures. They can interrupt business plans for Cessation of Production (CoP) and decommissioning. An asset failure may bring these dates forward, resulting in extra costs and pressure to execute before completion of the planning and preparation.

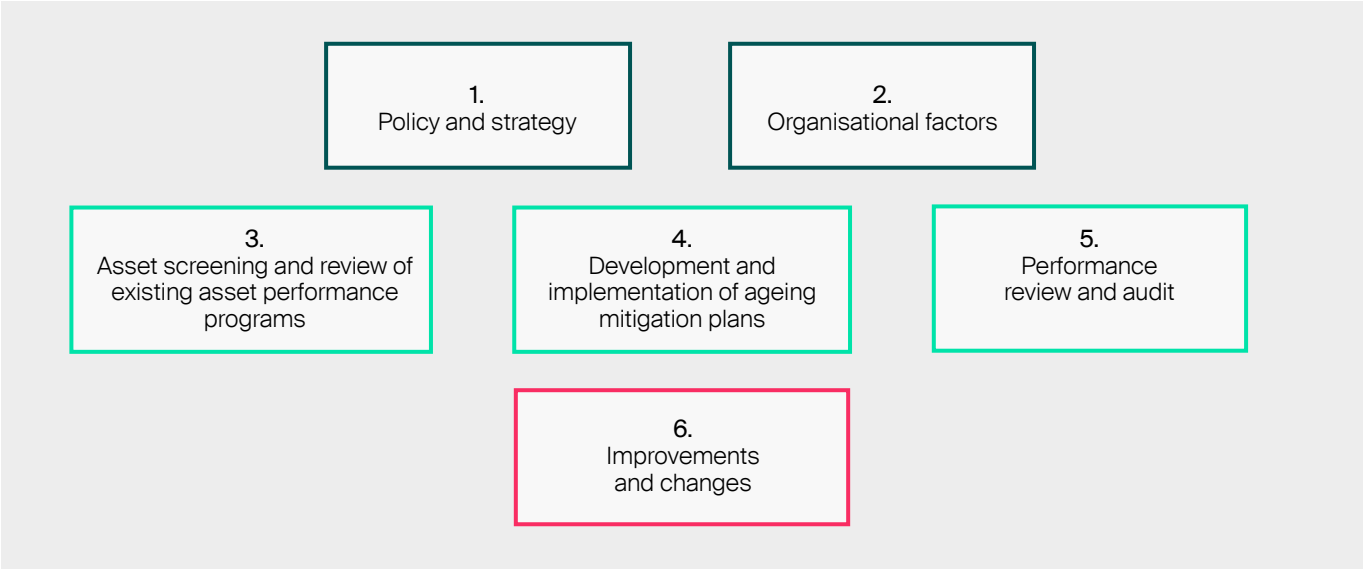
Managing the challenges of ageing assets

While the risks of ageing assets are clear, there are challenges to managing these assets optimally and safely.

Ageing assets do not fit well into a time-based asset management strategy. While many preventative maintenance programs are built around time-based inspections or interventions, this strategy is not ideal. Risks change as assets mature. Once they operate beyond their design life, simple time-based tasks are insufficient to prevent failure.

[1] Energy Division. (2010). Key Program 4 (KP4) Ageing and life extension programme. Retrieved December 1, 2018, (online) http://www.hse.gov.uk/offshore/ageing/kp4-report.pdf

[2] Health and Safety Executive, (2011-2013), Key Programme 4 (KP4) Ageing and life extension programme, A report by the Energy Division of HSE's Hazardous Installations Directorate, (online) https://www.hse.gov.uk/offshore/ageing/kp4-report.pdf



Quality information is critical for any asset management program - but data history for ageing assets is often not well kept. Changes to the design and operating conditions of a plant over time also change the operating envelope of an asset.

Changing regulations also affect the risk profile of a mature asset and its long-term fitness for service. Some older assets may not be able to meet new safety or environmental regulations. Regulators may make allowances for older assets, but production plants are under pressure to maintain the highest safety and environmental standards. At some point, the risk of managing an ageing asset relative to current legislation may outweigh the cost of a replacement.

Reactive maintenance strategies cannot overcome the challenges of managing ageing assets. A strategic plan with a proactive approach is needed to minimise the risks of a mature asset base.

A risk-based model is central to a structured ageing asset and life extension program. Asset Life Assessment (ALA) can help clients to build a line of sight on the cost profile for up to twenty years, prioritising CAPEX and OPEX. The model provides a foundation for optimising the performance of assets while managing risks to acceptable levels.

A solution for life extension

1. Policy and strategy

Any asset management strategy depends on the vision and support of an organisation's leadership for success. It needs a clear senior management mandate as defined in a governing policy. This policy must translate into a strategy, which determines the scope of the asset management system and aligns this with the Strategic Asset Management Plan (SAMP) and the asset management policy. Policies and strategies should describe the requirements for life extension and its limits.

Key enablers for policy and strategy include:

- Incorporating the governing policy into existing company policies and procedures
- Defining accountability and measuring performance
- Empowerment of departments and individuals
- Engagement with the leadership team
- A system of periodic review

2. Organisational factors

Organisational factors enable the implementation of the policy and strategy. They include developing systems for capturing information from retiring employees. Clarity of roles and responsibilities is essential as well as a commitment to develop and maintain competence.

Communication channels must exist for updating management with changes to risk. It may even be worth creating an Asset Life Extension (ALE) role within the management team.

Technical resources and training help with the transfer of knowledge. Succession planning and outsourcing decisions also influence the state of the facility's knowledge base. Communication and decision-making protocols must be well established and documented so that all role-players understand where they fit in the process and how they contribute to the ALE.

3. Asset screening and review of existing asset performance programs

Dedicating the same amount of resources and effort to every asset in a facility isn't realistic. A process of screening is essential to determine which assets are the highest risks and have the most significant consequence of failure. Identifying failure modes enables the design of monitoring programs to warn of potential problems. This step in the ALE program includes an evaluation of existing monitoring programs through a set of bespoke screening enablers. It ensures that the right checks are happening at the right frequency without wasting time on unnecessary tasks.

4. Development and implementation of ageing mitigation plans

Ageing mitigation plans should be integrated and provide a holistic overview. Essentially the plans should incorporate data trends and analytics, monitoring and inspection methods, maintenance tasks and acceptance criteria.

Mitigation plans cover multiple disciplines and departments in a production environment. Plans must be updated as new information and new factors become available which can increase the risk.

Using performance indicators can help to highlight deviations for further investigation.

5. Performance review and audit

Performance review and audit provides a high-level assessment of the ageing assets policy and strategic effectiveness. Changes to risk and ALE period are reviewed and actioned at the strategic level. If a mature asset has failed to live up to performance expectations, the review and audit process may initiate a root cause analysis or another form of investigation. Experienced and competent third parties should conduct audits so that they can identify areas for improvement.

Some high level indicators for monitoring performance include the following:

- Integrity and reliability
- Organisational and operational risk factors
- Monitoring and inspection
- Maintenance measures
- Statistical methods
- Failures analysis for ageing phenomena

6. Improvements and changes

A process of continuous improvement allows management teams to refine the model, as well as its execution. Taking advantage of industry initiatives and collaborative efforts will also help to understand the risks of ageing assets and apply learnings from other industries.

Benefits of a structured management program

Implementing a structured asset management program has quantifiable benefits. For example, research shows that in the utilities industry, “Organisations that adopt a leading practice approach to asset management can achieve financial benefits equivalent to roughly 20% of their total spending portfolio within three to five years.”[3]

Conclusion

Ageing assets are a current and future reality for a wide range of industries. With ageing assets comes an increased risk of failure and loss of production along with safety and environmental concerns. The challenges associated with ageing assets can only be overcome with a structured program for asset management and asset life extension.

[3] EY. (2017). Managing power assets for maximum performance, (online) https://www.ey.com/Publication/vwLUAssets/EY-managing-power-assets-for-maximum-performance/$FILE/EY-managing-power-assets-for-maximum-performance.pdf.

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