SSG Case Study

This template is to provide input to the IAM Subject Specific Guidelines Project. The aim is to capture individual and collective experience of operational and technical practices so that it can be shared and discussed. *Suggested* headings are shown in **bold.** Comments and suggestions are shown in italics.

Author: Jamshid Masoumian
Company represented:
Role: ***Maintenance Planner, CMMS/EAM Developer & Asset Reliability Engineer***
Sector: *petrochemical*
Asset owner:

1.1 Enhancing Asset Management in Methanol Production: A Case Study in Asset Reconstruction, CMMS Implementation, and Life Cycle Considerations

1.1.10 Introduction

In the realm of asset management, the process of creating and acquiring assets involves a multifaceted approach that extends beyond physical structures to encompass digital solutions and innovative technologies. At the core of this process lie fundamental principles that guide the identification, acquisition, and utilization of assets, ensuring optimal performance and long-term value. Concurrently, the seamless transition of new assets into operational use is pivotal for organizational success, necessitating meticulous planning and strategic implementation. This phase demands a comprehensive understanding of key factors that influence the effective creation and acquisition of assets, including but not limited to financial considerations, technological integration, and sustainability. As organizations navigate the complexities of asset management, these principles, transition strategies, and key factors play an integral role in shaping robust and sustainable asset portfolios.

1.2.10 Description of assets in study

This case study included the last phase of physical asset management and implementation of CMMS for a petrochemical factory. Our last phase was collecting all the physical assets of the Methanol Production Plant. This equipment includes 20,000 assets, including furnaces, compressors, pumps, control equipment and precision instruments, lines, steam traps, valves, towers, as well as buildings and infrastructures, computers and internal networks, and everything based on the standard, as well as accounting documents were considered assets.

1.3.10 When was the activity carried out?

This phase started in 2018 and ended at the beginning of 2019. Also, some maintenance procedures were modified until April 2019. Enterprise Asset Management and Maintenance Management Projects never stop and constantly need to be modified and improved. KPIs always show us the way to improve.

The activity was carried out due to several compelling reasons:

1. Ageing assets: The existing assets were ageing, leading to concerns about their reliability and efficiency over time.

2. Sanctions in Iran: The sanctions in Iran made it challenging to access spare parts and repair engineers, necessitating a re-evaluation of the asset management system.

3. Safety concerns: Safety considerations prompted the need for a high-reliability system, especially in the absence of readily available spare parts and repair expertise.

4. Environmental impact/sustainability: The environmental impact and sustainability concerns played a role in the decision to design and implement an up-to-date system, ensuring efficient resource usage.

The approach used to prioritize and select optimal courses of action included assessing the overall impact on the organization, considering the collective impact on multiple assets rather than individual projects, as well as cost-effectiveness, long-term sustainability, and reliability of proposed courses of action or investment in work programs.

The rationale was to optimize the entire asset management system to ensure reliability and sustainability despite the challenges posed by sanctions and limited access to spare parts and repair engineers.

1.4.10 Methodology

The process of asset data gathering and standardizing was performed according to the asset tree and parent-child relationships. This model based on ISO 14224, focuses on the data required for use in various analyses and on standardized data collection. It is also a format for facilitating the exchange of Reliability & Maintenance (RM) data throughout the operational life cycle.

The method for Work Order Priorities has also been implemented based on the very practical model by Mr. Daryl Mather (Plant Maintenance Resource Center). This method provides the time limits for work orders and deadlines, firstly based on safety and environmental considerations and then based on their impact on the production process. FMEA was used to feed into the risk assessment.

1.5.10 References

It has been a new project and a mechanization of physical asset management. All concepts of physical asset management, organizational approaches, and new frameworks for maintenance management were reviewed based on ISO 55000. Reliability & Maintenance data was collected following ISO14224 and implemented in the form of one of the most popular global CMMS.

1.6.10 Risk types

Due to the huge size and volume of the project, some of the risks and challenges were as follows:

- Risk of availability. Due to the old equipment and documents, there was a risk of missing some documents and records.

- Design risk. In some cases, this has required the redesign and localization of concepts as well as software modules. This was due to language differences in perceptions and software customization.

- Financing risk. Due to exchange rate changes.

- The risk of project management and planning. Due to the participation of many internal and external departments and experts.

- The technology risk. Due to paperless CMMS, hardware and software requirements and internal and external networks.

1.7.10 Tools used

In this project, a prominent and popular CMMS software was used. Office software, especially Excel, was used to collect primary information and monitor it, and the workflow was drawn with Visio software. Also, the internal network and the external network (Internet) was used to communicate with the contractor.

1.8.10 Costing

The cost-effectiveness analysis of the project was based on the comparison of benefits and costs. The following questions were considered for the CMMS implementation:

What will be the effect on the cost of unplanned shutdowns?

How much will it reduce the cost of safety and human risks?

What effects will it have on the optimal performance of equipment and on reducing environmental pollution in the petrochemical industry?

All the following analyses convinced the management that the cost of this project is very low for the organization in terms of return on investment.

1.9.10 People

This project had ten full-time data importers, four software analysts and standards reviewers, four mechanical engineers, four machinery experts, four electrical experts, two safety experts, and one environmental expert.

1.10.10 Evaluation

What was the main output of the activity?

The main output of this activity was a comprehensive understanding of the risks associated with asset reliability within the Methanol Plant. By developing a Computerized Maintenance Management System (CMMS), the development of asset management aims to enhance operational reliability, reduce downtime, and optimize maintenance strategies. This involves identifying potential failure points, implementing predictive maintenance measures, and establishing protocols to mitigate operational risks. Ultimately, the goal is to ensure the seamless functioning of critical assets, minimize operational disruptions, and maximize overall plant efficiency.

Validation

In the validation process, the outputs were rigorously scrutinized and validated through a comparative analysis of past maintenance reports. Additionally, an ISO 55000 audit, conducted by external experts, provided an independent evaluation of the implemented CMMS and asset management strategies. The results were further validated through practical application, ensuring that the projected improvements in asset reliability and maintenance efficiency were borne out in practice. This approach was subject to independent audit and continuous improvement, with regular assessments and feedback mechanisms integrated into the maintenance processes.

Outcome

The activity was successful, yielding positive results that aligned with the initial predictions. The implemented CMMS and refined asset management strategies led to a notable improvement in overall plant reliability and maintenance efficiency. As a result, embedded processes and practices were changed, with a greater emphasis on predictive maintenance, real-time monitoring, and streamlined maintenance protocols. In hindsight, while the project achieved its objectives, a more comprehensive change management strategy could have been employed to ensure smoother adoption of the new processes across all levels of the organization. Additionally, further stakeholder engagement at an earlier stage might have facilitated a more seamless integration of the CMMS into existing workflows and practices, potentially enhancing the overall impact of the project.

This case study was kindly submitted by Jamshid Masoumian, Maintenance Planner, CMMS/EAM Developer & Asset Reliability Engineer.