

Paradigm Shift of Corrosion Management Using IOW Programs

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ABSTRACT

Proactive corrosion monitoring programs are playing a key role in determining the operating life and health of the capital assets. One of the most critical programs that is being implemented in the oil and gas processing facilities is the Integrity Operating Window (IOW) program. Such a corrosion management program is mainly intended to provide an instant approach to assess the integrity level of the assets by gathering information from operations, lab services, process, and inspection data in order to produce out a systematic corrosion control program that elaboratively impact the prevention of integrity threat and further prevent loss of primary containment. However, the challenge in IOW programs is centered around rendering a full cycled corrosion management strategy that is communicated through an auto generated alarm system. At one of the leading energy companies in Oman, engineers from various disciplines were successful in configuring a full real time IOW corrosion management program using digitalization tools and pre-set IOW key performance indicators (KPIs).

Key words: Corrosion management, digitalization, integrity operating window.

INTRODUCTION

The purpose of this paper is to emphasize the current advancements of monitoring the integrity level of the processing facilities using means of Integrity Operating Window (IOW) program. In our company, integrity and material & corrosion departments across the upstream and downstream businesses successfully implemented a well oriented and constructive IOW programs to manage the corrosion risks

and monitor the integrity level of the capital assets and proactively assess the situation to prevent loss of primary containment. The technology that sets behind this success is the digitalized approach that gathers information from process, operations, lab services and inspection programs and converts them all into a high-level real-time tracking system that assesses the current status of corrosion threats and integrity level. Through that, the second major success is centered around the KPI system that is being used to track the performance and the efficiency of the IOW program. This KPI system is directly linked to the process safety management indicators to ensure that the full performance image of the assets is demonstrated.

Oil and gas operators around the world elaboratively agree on the need for efficient corrosion management programs and strategies to prevent loss of primary containment. However, the methodologies of managing those programs vary depending on the approach and the required tools. IOW program is one of the most effective tools that is used to manage corrosion, monitor the integrity parameters, and assess the final corrosion management recommendations. The journey of IOW program passes through multiple stages including team formation, IOW alignment workshops, integrity operating parameters setting, approval of the parameters, continues monitoring, and supply of corrosion management recommendations in case of any excursions. Further, the IOW program is a proactive approach tool that needs to be continuously monitored through a Key Performance Indicator (KPI) system. The establishment of a well-oriented KPI system for the IOW program shall include important key factors such as time in exceedance (TIE) and the criticality of the IOW parameter. Digitalization plays a significant role in integrating the IOW key tools and the KPI system in a real time monitoring interface. By using digitalized means and integrating them with corrosion probes and real time corrosion sensors, reliable data can be collected, and the respective corrosion management recommendation can be assessed. All in all, the final picture of the IOW program with the well-established KPI system will result in a corrosion management strategy that proactively alarms the user and efficiently prevents any integrity threat in the near future.

This paper demonstrates the role of digitalization in enhancing corrosion management and monitoring programs. Through that, IOW programs are implemented in many organizations around the world but some of them are lacking the efficient monitoring techniques and the automation of the alarming and tracking systems that proactively notify the subject matter experts in case of any violation in the pre-set limits. Digitalization plays the most significant role in the success of IOW program in which alarming systems are auto generated and KPI indicators are easily tracked. All in all, digitalizing the IOW program and providing the right KPI measures will enhance the integrity level of the assets and, will subsequently, prevent corrosion threats or reduce their severity proactively.

EXPERIMENTAL PROCEDURE

IOW journey in our company had started in 2014. During which, it was implemented in a single unit as a pilot unit. The unit selected was the crude distillation unit (CDU). The unit was chosen because of its criticality and the corrosion issues that it sees. Therefore, a very well controlled and closely monitored operation parameters are crucial. The built-in experience from 2014 until late 2018 had resulted in a robust IOW system with a very sound field experience as well as knowledge in corrosion issues. This experience has promoted the company to go with IOW implementation beyond the running plants, but to cover those units right from projects phases as well. Starting from 2019, IOW implementation in steam cracker units during the commissioning phase had started. The target was to have the system ready and

IOW limits are frozen and agreed by all stakeholders before the plant enters to the steady state operation phase. IOW system, in both running units and those in commissioning, had helped the asset integrity team to:

- Prevent Loss of Primary Containment (LoPC).
- Predict corrosion issues before they occur.
- Increase the reliability and integrity of all plants.
- Unify all departments' effort toward Plant's integrity and reliability.

IOW is a multi-phase process which starts with a team formation and ends with IOW monitoring and reporting. IOW is an evergreen dynamic process considering the changes in feed properties or operating conditions. However, any changes in the IOW limits shall follow the Management of Change (MOC) process. Figure 1 below show the high-level workflow that has been followed during the development of the IOW system. Moreover, as illustrated by Figure 2, the IOW program establishment goes through a detailed work process to collect the data and align the system establishment across various plants with diverse operating regimes.



Figure 1: High-level workflow to establish a proper IOW system