Vysus Group

Whitepaper

Five best practices for implementing an effective IOW programme

Integrity Operating Window (IOW) programs can help turn a reactive Risk Based Inspection (RBI) approach into a proactive, digital solution that cuts asset operational costs while enhancing safety.

Recent developments

Integrity Operating Windows (IOWs) are allowable operating limits for key process variables that can affect equipment integrity as a result of corrosion or other damage mechanisms (DMs). Knowing these limits – and if/ when they are exceeded – is extremely valuable.

Today, many organisations across various sectors with high-risk and capital-intensive assets are keen to start the journey to harness benefits from an IOW program. Others have taken big strides already. For any business, the IOW journey begins by creating Corrosion Control Documents (CCDs) or undertaking detailed corrosion studies. These form the basis of identifying the candidate parameters that are key to developing an IOW program. Few organisations have yet mastered how the two tools, CCDs and IOWs, are best applied to transform Risk Based Inspection (RBI) into next-generation, cost-effective mechanical integrity programs.

This guide shares insights Vysus Group has gained supporting a range of clients with their CCDs, IOWs and related Damage Mechanism Reviews (DMRs). Maturity levels vary, from organisations with a robust RBI program who are looking to reap additional benefits, to companies beginning the process or simply trying to meet regulatory requirements such as AB-505, API-580 and API-970, as effectively as possible.

A historical perspective on RBI

Across oil and gas streams over the past two decades, RBI approaches have enhanced asset integrity. They have focused inspection, and the associated costs, on the most critical equipment. However, the risk picture has also moved on with changes in process conditions, increased throughputs and the introduction of a new workforce. All equipment degrades during its years of in-service operation, sometimes at rates higher than expected. Mature assets cannot be expected to perform as they did before the process conditions altered. Inevitably, the risk associated with such failures increases, while traditional RBI programs remain static. RBI methodology uses process conditions and equipment history at a snapshot in time to recommend inspection strategies which can cover the span of the equipment's remaining life.

The challenge is, on a day-to-day level, changes that happen in process conditions (such as excursions and upsets) are not fed back into the risk and criticality calculation. IOWs address this issue. Once identified, allowable operating limits can be used with a framework that captures process changes as they happen, in real time. If limits are exceeded, an IOW program can be used to generate a timely response, preventing the onset of rapid asset deterioration. Or, it can raise a flag or alert to trigger a response, addressing long-term integrity concerns that may necessitate future action.

Five best practices

Develop a high-quality IOW program

IOWs require detailed review

Key requirements for identifying IOWs

IOW programs are designed to provide real-time notification

IOW logging system management process

The concepts behind IOWs have been around for a few decades under various names, but their real potential has not been seen to date. Industry at large has incorporated the intelligence of generating IOWs, identifying the key parameters and values and documenting threshold values along with required actions and timeframes. Now, with the acceptance of API-970 and the best practice of generating and maintaining CCDs, incorporating IOWs is becoming a necessity and is vital to ensuring optimum results. Numerous organisations are in the same position, somewhere along the curve of starting to generate CCDs and finishing the arc with an implemented IOW program - tying all their mechanical integrity related efforts together.

Phases for an IOW programme

There are six main stages to putting an IOW programme in place:

1. Collect and review process and inspection data
2. Create corrosion loops or circuits
3. Conduct corrosion studies/damage mechanism reviews (DMRs)
4. Establish IOW limits
5. Implement the IOW program, identifying actions and responsibilities
6. Program the appropriate distributed control system (DCS) alarms, configure process historian software, and create dashboards.

Best practices

Five best practices are emerging when establishing an effective IOW program:

1. Developing a high-quality IOW program requires strong teamwork between corrosion experts, process engineers and plant personnel. This is essential for program implementation and ownership.

2. Identification of actionable and realistic IOWs requires a detailed review and fundamental understanding of an asset's processes, construction materials, and expected corrosion and other damage mechanisms.

3. The key requirements for identifying IOW candidate process parameters are to ensure that the parameters can be measurable and preferably controllable. Alert level parameters can be utilized effectively as well for warnings.

4. A properly implemented IOW program is designed to provide real-time notification of an increased risk to the integrity of an asset. It is essential that, following such notification, systems also allow timely, proactive action to prevent incidents or evaluate increased risks.

5. Informational IOWs on slow acting mechanisms should be addressed and leveraged to tie into a logging system or a management of change process that can be triggered in due time.

Benefits that speak for themselves

Implementing best practice reaps rewards, with the benefits of IOW programs turning a reactive RBI approach into a proactive process, including:

- Allowing for more accurate turnaround and management planning and execution
- Preventing the surprise appearance of potentially new damage mechanisms
- Optimising the use of alternative and opportunity feedstock and managing the risks
- Enabling more informed decision-making for operation changes
- Reducing cost overruns, inspection overheads and unplanned shutdowns
- Enhancing safety, while extending the operating life of an asset.

Well-managed, properly implemented RBI programmes create a sustainable and continuously improving business process.

Overcoming IOW challenges

There can however be challenges and issues that arise in your CCD and IOW quest that fall into these common areas:

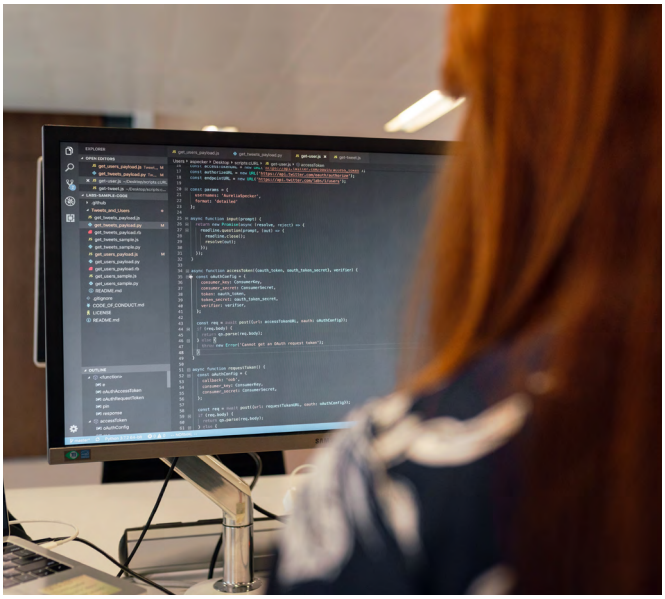
- Improper IOW selection leading to too many alarms and alerts leading to a state called “normalization of deviation”
- Increased monitoring frequencies and costs for monitoring key IOWs
- Increased upfront costs to meet regulatory requirements
- Not using informational IOWs effectively
- Adopting an appropriate IOW software solution to manage the alerts

Theses can be overcoming though the application of technology. Progress in the fields of monitoring and sensing, along with leaps in software capability and data acquisition, can be leveraged. Plant leadership teams can benefit from smart dashboards, providing at-a-glance clarity and enabling information-based decision-making.

Conclusion: From RBI to IOW and beyond

Well-managed, properly implemented RBI programmes create a sustainable and continuously improving business process. This is the ideal model for modern asset integrity management. These programmes systemically allow the user to document both cost and risk reductions over time.

Incorporating an IOW program significantly complements an existing RBI approach in completing the mechanical integrity picture. It helps predict, locate and recommend actions to avoid incidents and proactively manage asset integrity. This transforms a traditionally reactive RBI program into a dynamic, digital framework solution that assesses risk changes on an ongoing basis.



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At Vysus Group we understand the impact that asset integrity and maintenance can have on production, safety and ultimately your bottom line. Our technical solutions and software help you to cost effectively manage and improve the integrity, risk, performance and reliability of equipment and assets.

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Get in touch

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