Stop Overlooking Quality During Turnarounds

The dss+ 6 Key Phases of Quality Management For Successful Turnarounds

How to achieve zero trips and leaks in turnarounds: strategies for maximum efficiency

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Protect. Transform. Sustain.

Introduction

The success of turnarounds is typically measured by the ability to complete them safely, on time, and within budget. However, quality goals are as crucial as safety, delivery, and cost considerations. Given the inherently time-sensitive nature of turnarounds, this raises a vital question: how can we ensure that quality is never compromised in our pursuit of timely, safe and budget-conscious delivery?

In April 2010, an explosion at the Tesoro Petroleum Refinery in Anacortes, Washington, United States, tragically claimed the lives of seven workers due to equipment failure and insufficient maintenance practices. A critical finding was the lack of proper inspections on a heat exchanger, representing a significant quality breach that played a major role in this catastrophic incident.

While challenges arise during turnarounds, incidents like the April 2010 Tesoro explosion in the United States, highlight crucial lessons. Investigations revealed that critical equipment inspections had been overlooked, underscoring the urgent need for a strong focus on quality.

Although not every quality lapse leads to a major incident, it can significantly impact an organisation's financial and operational health. Poorly executed jobs often surface during or after a turnaround, resulting in excessive rework, startup delays, and plant trips that lead to production losses. These issues can significantly extend the duration of turnarounds and cause further production disruptions.

The solution is clear: in addition to safety, organisations must prioritise quality throughout all turnaround planning and preparation phases. Emphasising quality is essential for the long-term viability of operations and fosters a culture of continuous improvement.

Integrating quality into every phase of turnaround management is crucial to effectively navigating the complexities of turnarounds.

This requires meticulous planning, rigorous monitoring, and robust verification processes, all contributing to successful outcomes and operational excellence. By prioritising quality at every stage, organisations can prevent potential crises and lay the groundwork for sustained operational success.

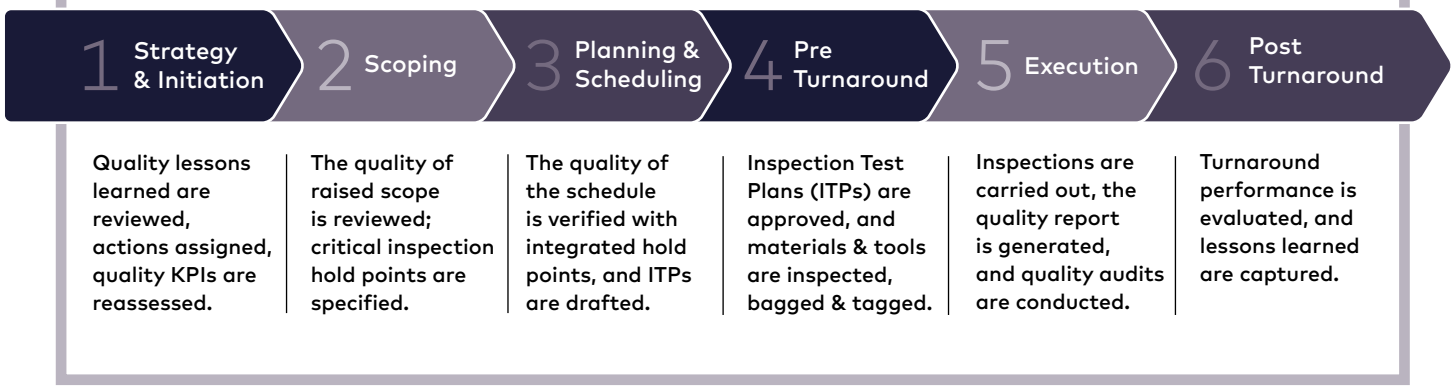

Figure 1: Quality in various stages of turnaround

Overview of Turnaround Quality

Ensuring quality throughout all stages of a turnaround is paramount for successful project execution and overall operational efficiency. A robust quality assurance and quality control (QA/QC) framework is essential, as it not only safeguards the integrity of the project, but also aligns with the *"four-eye principle."* This principle emphasises the importance of having critical review of critical processes and decisions, thus minimising the risk of errors and ensuring accountability.

Leveraging Digital Solutions

Digital tools play a pivotal role in enhancing quality control during turnarounds, helping to ensure that safety, efficiency, and quality standards are met. Predictive maintenance software enables organisations to monitor equipment health in real time, identifying potential failures before they occur and allowing for proactive maintenance. Generative AI-based risk assessments can analyse vast amounts of data to predict potential quality lapses and suggest preventive measures, significantly reducing the likelihood of incidents.

Additionally, real-time tracking dashboards provide teams with up-to-the-minute information on project progress and quality metrics, facilitating immediate responses to any issues that arise. By leveraging these digital innovations, organisations can maintain a sharp focus on quality, ensuring that it remains a top priority even within the demanding timelines of turnaround projects.

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Quality in Scoping

Turnaround Scope

Upon defining the turnaround scope, conducting a comprehensive quality review is essential to ensure alignment with project goals and standards.

Key focus areas include:

- **Safety and Process Integrity:** Executing comprehensive Process Hazard Analysis (PHA), Management of Change (MOC), and Hazard and Operability (HAZOP) assessments to mitigate risks and ensure compliance with safety protocols.
- **Electrical and Instrumentation Systems:** Undertaking detailed system inspections, calibration of instrumentation, and verification of safety functions to guarantee reliability and adherence to regulatory standards.
- **Mechanical Integrity:** Addressing critical concerns such as Corrosion Under Insulation (CUI) and prioritising preventive maintenance to uphold equipment durability and operational continuity.
- **Operations Backlog:** Systematically resolving outstanding action items to enhance efficiency and reduce the risk of operational disruptions.
- **Risk-Based Inspection:** Implementing a strategic, risk-based inspection framework, targeting priority areas to reinforce asset integrity and optimise resource allocation.

This review ensures clarity in tasks and resources, with measurable outputs for compliance and effectiveness.

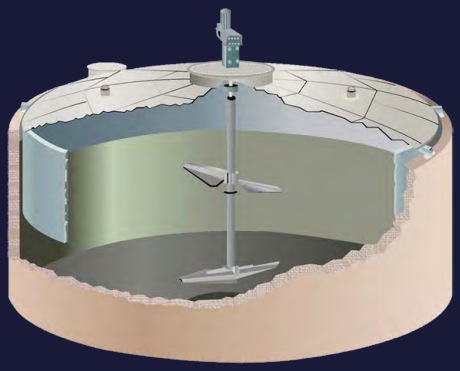
Contingency planning

Contingency planning is vital for minimising the impact of unforeseen events and ensuring the achievement of turnaround objectives.

Key aspects include:

- **Proactive Anticipation:** Foreseeing potential challenges and preparing responses for events that deviate from the original plan.
- **Options for Unexpected Events:** Providing strategies to manage unexpected situations before or during the turnaround, mitigating their effects and reducing delays.
- **Impact of Inspections:** Recognising that routine inspections can uncover additional work, which may significantly affect the turnaround schedule and budget, and making provisions to address these findings.

Example of Contingency Scope



Assume a turnaround job involves opening a mechanical mixer to inspect the internals for mild corrosion.

- While corrosion is expected, an unforeseen, cracked paddle may also be discovered. If no provisions for paddle replacement have been made in advance, the turnaround could be delayed for days while a replacement is sourced, or we may have to drop the scope entirely.

- During contingency planning meetings, the turnaround team will consider all potential issues related to the mechanical mixer inspection that could extend the job and impact the overall turnaround schedule, especially if it is on the critical path.

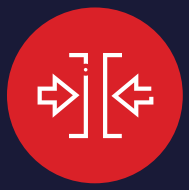
- Additional turnaround scope may be added based on the likelihood of needing further work.

Quality in Planning & Scheduling

Turnaround Schedule Quality

The safe and successful execution of a turnaround depends on a robust schedule that outlines timing, responsibilities, and activity durations. This requires creating a schedule based on technical best practices supported by industry standards. Once the schedule is finalised, a dedicated review should be conducted to assess its quality and ascertain further areas for improvement.

Key factors to consider when reviewing the schedule quality are:



Constraints

Are hard and soft constraints included to define the limits of scheduling flexibility?

Lag Types

Have negative and positive lags been identified to manage the sequencing of activities?

Activity Relationships

Are 'Finish-to-Start' or other activity relationships clearly defined in the schedule?

Float Management

Have activities with negative or zero float been identified?

Resource Considerations

Do crafts load the scheduled resources to meet execution requirements and maintain progress?

Contingency Planning

Has sufficient uncertainty allowance been allocated to address unforeseen events and repairs?

Inspection Schedule

Are all inspections and hold points clearly visible in the schedule by discipline?

FAT

Is there any equipment that requires factory acceptance testing? When should it be done?

Inspection and Testing Plans (ITPs)

An ITP is a comprehensive document outlining the critical steps for executing specific tasks during a turnaround is essential for ensuring the quality of each phase. This document defines the responsibilities of the execution team and the owner or third-party inspectors, including clear pass/fail criteria to support objective evaluations of each step's successful completion.

The Inspection Test Plan (ITP) brings together multiple stakeholders, including execution teams, quality control personnel, and various owner departments. It includes reliability, quality control, operations, and process engineering. Therefore, ITPS must be thoroughly reviewed by all relevant parties well before the turnaround to ensure their relevance and accuracy for effective field application.

When reviewing ITPs, key considerations include:

Historical Data	Leveraging past inspection, performance, and maintenance data to prioritise critical inspections.
Critical Hold Points	Carefully selecting points where work will pause until verification by the appropriate parties is completed.
Clear Pass/ Fail Criteria	Establishing objective criteria for each inspection step to determine acceptability.
Relevant Standards	Ensuring that site-specific standards are appropriately referenced.

An inspection **hold point** is a stage in a project where work must pause until a specific inspection is conducted and approved.

For example, during a turnaround, a vessel inspection hold point may occur after the internal cleaning of a pressure vessel. The inspection team must verify that the vessel is free of contaminants and meets safety standards before any repairs or maintenance can proceed.

Quality in Pre-turnaround

Inspection of materials, equipment, and tools

Quality control of incoming materials, equipment and tools is done by verifying quantities, inspecting visually and ensuring proper storage as follows:

Step 1: Routing incoming material to a designated location for appropriate inspections.

Step 2: Conducting visual inspections for compliance with relevant standards and codes.

Step 3: Maintaining a material inspection report to record and track received items.

Step 4: Ensuring proper storage and handling of materials, and tools to maintain quality until use.

Step 5: Implementing bagging and tagging to confirm inspections.

Step 6: Utilising a material tracker with the status of each item from ordering until it is bagged and tagged.

Quality in Execution

Daily Quality Report

While organisations often have a Daily Turnaround (Flash) Report that focuses primarily on the overall progress of the turnaround, it may not adequately address quality activities. To bridge this gap, organisations and quality control teams should implement a more detailed Daily Quality Report. This report would capture key quality metrics, identify issues, provide recommendations, and update inspection progress during execution.

Specifically, this report includes:

- Status of key recommendations (from equipment inspection) highlighting the past 24 hours
- Status of equipment, flange, valve, and blind tracking
- Selected execution-related quality KPIs
- Open risks highlighted by quality control inspectors
- Major planned inspections for the next 24 hrs., specifying departments involved
- Material and equipment tracker., etc.)

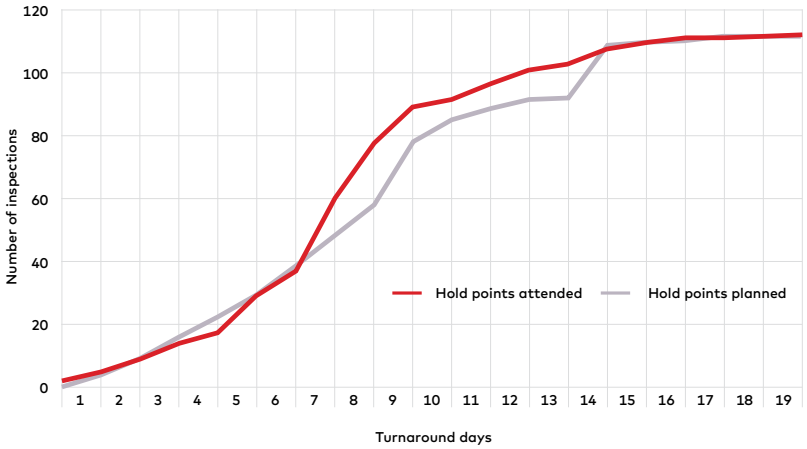


Figure 2: Hold point plan vs actual (illustrative)

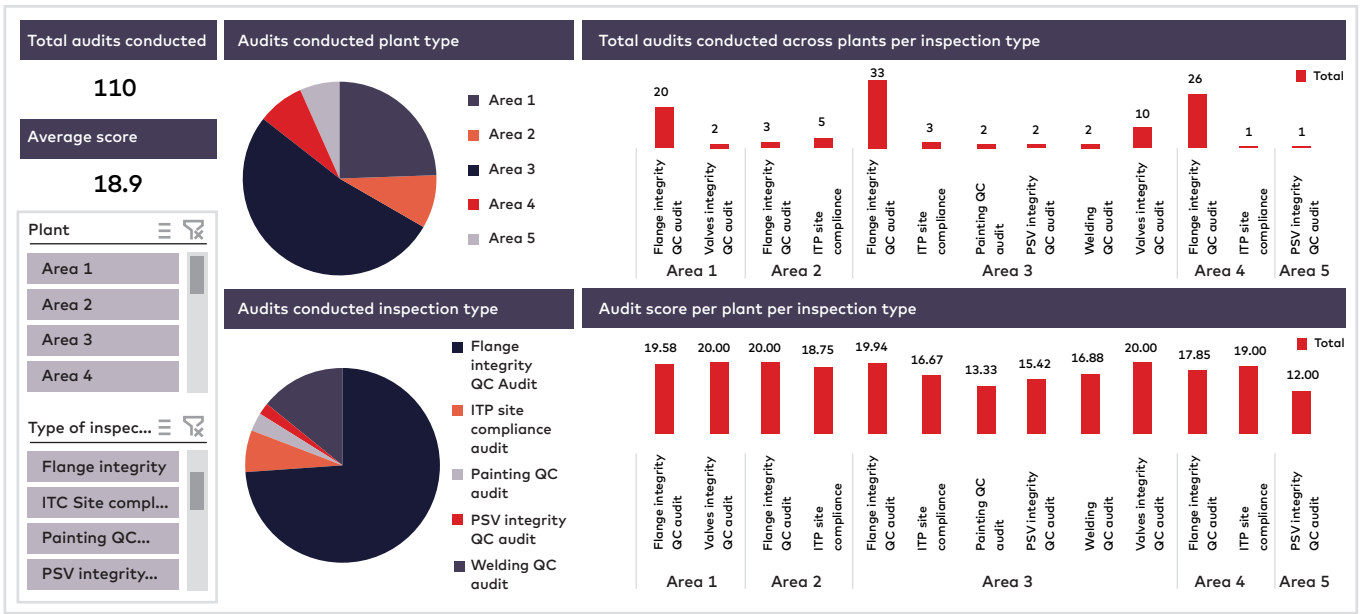
Visual Board for Quality

Key activities & risks for quality shall be presented daily to ensure visibility in front of management and the full turnaround team.

Examples of such visuals include:

- Hold points compliance (how many quality hold points attended to vs plan)
- Quality audit conducted (number of audits conducted, which area, for type of job, and audit scores)

Figure 3: Quality audit dashboard (illustrative)



Quality Post Turnaround

Capturing lessons learned and **Specific, Measurable, Achievable, Relevant, Time-bound (SMART) actions** are essential for continuous improvement. A comprehensive review should analyse quality lessons from the previous turnaround and identify SMART actions.

Key areas to consider under the post-turnaround quality are:

- Competence of inspectors;
- The adequacy ofinspection testing plans;
- The clarity and timely closure of inspection recommendations;
- Amount of re-work;
- Scope dropped.

Additionally, contractor or third-party performance should be assessed in post-contract evaluations to improve selection and enhance quality management for future projects. This systematic approach strengthens quality assurance and fosters a culture of continuous improvement within the organisation.

Conclusion

Quality management is essential for successful turnaround projects, serving as a foundational pillar that ensures safety, timeliness, and operational reliability.

Embedding industry-leading best practices, structured rituals, and targeted coaching across departments cultivates a culture of continuous improvement and drives cross-functional synergies in Quality Management.

By aligning teams around shared objectives and fostering robust capabilities, organisations can deliver sustainable quality performance throughout the turnaround lifecycle. This integrated approach not only enhances operational efficiency but also strengthens the organisation's ability to proactively address complex challenges, ensuring that safety and reliability are uncompromised at every stage.

Lessons from past incidents, such as the Tesoro Petroleum Refinery explosion, emphasise the necessity of rigorous quality assurance practices. Implementing structured tools like Inspection Test Plans (ITPs), Daily Quality Reports, and comprehensive material inspection protocols foster accountability and continuous improvement, allowing teams to address potential issues proactively.

Utilising various quality management tools ensures that standards are met throughout the turnaround lifecycle. For instance, visual boards for tracking hold points and quality audits provide real-time insights, while contingency planning frameworks prepare teams for unexpected challenges. These tools contribute to a cohesive strategy that drives effective execution and minimises disruptions.

In summary, **integrating quality management into turnaround projects is not only a necessity but a strategic advantage.**

Organisations that adopt this approach will improve immediate project performance and establish a resilient foundation for future endeavours. As the industry evolves, a steadfast commitment to quality will remain crucial for sustainable success and operational excellence.

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