

OIL AND GAS CASE STUDY - MAJOR OIL AND GAS COMPANY

# Non-Intrusive Inspection (NII) of offshore process vessels

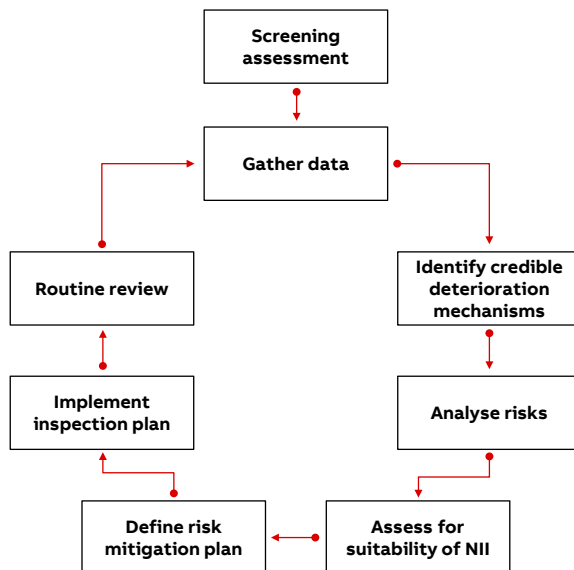


ABB identifies process vessels suitable for NII and defines inspection plans using Risk Based Inspection (RBI) methodology.

The client operates offshore and onshore oil and gas processing facilities. ABB was engaged to assess the major process vessels across the assets for suitability for NII and to define appropriate inspection plans and inspection intervals using a RBI methodology. The assessments provide a thorough understanding of all the potential degradation mechanisms that could affect each vessel. This new understanding enabled appropriate risk mitigation strategies such as NII to be defined and justified.

“ABB took our complex situation of uncertain pressure vessel history and used a professional and structured approach to NII and RBI to put us in a much better place where future inspection requirements are now mapped out and risk is managed better.”

The ABB RBI+ process.



Integrity Engineer

## Solution

The initial requirement was to define the scope of the detailed RBI and NII assessments. ABB undertook a screening study to identify the process vessels that, due to their design, operating conditions and consequences of failure, warranted thorough analysis in order to derive an inspection plan. The screening study confirmed that 261 process vessels across assets should be subject to the detailed RBI / NII assessments.

## RBI+© methodology

The assessments were delivered using ABB’s RBI+© software tool ensuring an efficient and robust assessment process. ABB has over 20 years experience of carrying out RBI reviews and has applied the RBI+© methodology to over 100,000 equipment items.

The methodology adopts a qualitative approach and requires a detailed understanding of equipment specific data such as current and historical operating conditions. The tool has been recently upgraded to enable the assessment and documentation for suitability of NII according to the guidelines in DNV-RP-G103.

### Data gathering

Gathering of all relevant data was the first stage of the assessment process. This work was undertaken remotely and consisted of the provision and review of data (vessel design, operating conditions, corrosion management and inspection histories) and teleconferences with the client's operations and integrity personnel. This ensured that ABB had a full understanding of the key current and historical issues. Teleconferences were held with corrosion engineers, inspection engineers, process engineers and offshore operations engineers.

### Deterioration mechanisms

Following the review of data gathered, ABB completed an analysis of the potential deterioration mechanisms for each vessel and assessed the risks associated with each mechanism. The consequence assessments were undertaken according to the client's models for EHS and business consequences.

### NII assessments

DNV-RP-G103 is recognised good practise for the implementation of NII strategies. ABB assessed each vessel for suitability for NII according to the guidance given in DNV-RP-G103. The output of these assessments concluded that 145 of the 261 vessels were suitable for NII.

### Risk mitigation plans

ABB then defined suitable risk mitigation plans for all credible deterioration mechanisms identified for each vessel. In addition to inspection plans, the mitigation plans included upgrades to operational controls such as extending the chemical analysis routines including sampling for MIC.

The fully drafted RBI and NII assessments were then reviewed by the combined client and ABB team. The review validated the assessments and confirmed the clients ownership of them. The validation reviews were carried out at the client's offices and required 28 days to review the 261 assessments.

### Benefits

The output of these assessments concluded that 145 of the 261 vessels were suitable for NII. There are several benefits associated with the NII of pressure vessels:

- Increased availability
- Inspection is often possible whilst the vessel is under normal operating conditions
- Reduced total cost of inspection
- Turnaround complexity and duration can be reduced since the inspection can often be undertaken outside of the event
- Man entry into the vessel, a potentially hazardous activity, is avoided
- Disturbance to the vessel, which can be a cause of deterioration, is minimised

Since the RBI assessment process results in a thorough understanding of the risks associated with vessel failure, the assessment team is able to prioritise inspections based upon risk and determine appropriate inspection plans and intervals, actively reducing the risk profile for the platforms.

The figure below summarises the inspection schedule defined by the project for one of the platforms assessed.

