OIL AND GAS CASE STUDY - MAJOR OIL REFINERY, UK

Extending refinery turnaround intervals

A major oil refinery was examining the possibility of increasing the interval between major turnarounds by 1 year to increase uptime.

However, before making the decision they wanted assurance that the safety and reliability of the plant would not be affected by this decision.

Shortage of internal resource led them to consider an external provider with the breadth of engineering expertise to establish the impact longer intervals would have on all the equipment on the site. With the worklist for the next turnaround being frozen in the relatively near future, a rapid response was required if this study was to be of value.

ABB was asked to carry out a review of all the site equipment with the aim of:

- Completing the process in a few weeks so as not to delay the turnaround
- Confirming that a 1 year increase in turnaround intervals was acceptable
- To identify actions required to allow extension in time
- The scope of the study was to assess 1328 items of equipment

Solution
To meet the tight deadlines a three stage approach was developed using existing ABB methodologies. The purpose of this was to focus on the most critical items and not waste time examining low consequence items or those where an extension to the turnaround interval would have negligible impact. A multi-disciplinary team, made up of site maintenance and operational personnel and ABB functional specialists, completed all stages of the work. ABB led the process.

Stage 1 - Pre-screening study
An initial rapid criticality study examined the risks from an extension in inspection interval. The aim was to identify all items with a low probability of problems occurring in the extra year of operation and with a low potential safety or business consequence. These items could then be eliminated from further studies. This step had to be effective to make the project feasible in the timescale but had to be robust to avoid introducing risk. Using ABB’s proven robust approach and expertise 83% of the plant items 1107 were shown to need no further study.
Stage 2 - Criticality analysis
A more detailed criticality study was then carried out on the 221 items remaining. This more detailed analysis enabled ABB to evaluate the consequences of an increased turnaround interval for these items and to indentify further equipment that did not require action or further study. An other 139 items were removed at this stage. The work followed ABB’s criticality process and tools.

Stage 3 - RBI study
The remaining 82 items (5%) required a detailed review to identify in greater detail what the consequences of an increased interval would be. This was done using Risk Based Inspection using ABB RBI+ software and our FMECA process. As the aim was only to confirm that the extension was appropriate the written schemes were not updated, saving more time. The study identified 6 items that needed actions to operate within acceptable risk boundaries. The required actions were defined by the team. A further 20 items were acceptable, but simple actions were identified that would reduce risks further.

- Problem
  Can the plant operate for another year

- Phase 1
  Pre-screening

- Phase 2
  Criticality analysis

- Phase 3
  Slimmed down RBI

- Decision
  Complete actions

Further RBI’s were planned following this project, to optimise inspection workscope in the turnaround and update written schemes.

Benefits
- Provided assurance that the turnaround interval could be extended by 1 year
- Defined actions required to support new turnaround intervals
- Completed a criticality assessment for all site equipment - a building block for later
- Completed in a very short timescale (and cost) so as not to delay turnaround planning