

ABB implements alarm rationalization for a gas terminal in Qatar



ABB was commissioned to rationalize alarm configuration for an onshore gas terminal in Qatar. The project served to demonstrate ABB's leading position in alarm rationalization..

Background

The ABB customer operates all phases of the oil and gas exploration, production and sales of crude oil, including natural gas, gas liquids, and refined products, among other activities. Operational activities to deliver this business model are conducted at various onshore and onshore locations.

Customer challenge

The main challenge was that plant operators were being overloaded with too many alarms. Too many alarms create issues in control rooms, such as operator fatigue and stress leading to reduced efficiency and response effectiveness, with key alarms often being missed. This widespread problem stems from the advent of the modern DCS control system functionality as it simplified the process for the configuration of alarms i.e. they could be added with a simple click of a mouse, with no consideration to the purpose and required operator response. Alarms were frequently assigned to routine operations, such as the opening/closing of valves or manned operations, where there is no operator response and as such should be treated as 'Events'. A high number of alarms were also generated by maintenance activities and 'Out of Service' equipment.

Knowing they had issues with alarm management, the customer added ABB's alarm management product suite, ABB AlarmInsight™, as part of a major upgrade of the ABB System 800xA control system. ABB UK used the AlarmInsight™ software application to help them identify issues with their current alarm system. The AlarmInsight™ Alarm Monitor application was used to review the performance of the alarm system against recognised international standards and guidance and in addition ABB used the AlarmInsight™ Alarm Rationalization Tool (ART) application to rationalize the configured alarms.

Why did the customer use ABB UK for this requirement?

Previously, the local ABB office in Qatar was engaged in an 800xA control system upgrade project and the installation of AlarmInsight™ software. ABB UK has extensive experience in the delivery of alarm improvement projects for a wide range of clients across the oil and gas, chemicals and enterprise sectors and ABB's Alarm Rationalisation Tool (ART) has been established for more than 18 years. The customer liked ABB UK's approach to simplifying alarm configuration, removing nuisance alarms to ensure that the alarm system supported the operators. The ABB UK alarm rationalisation processes are platform-independent and so can apply to any installed technology.

The ABB approach to alarm rationalization

ABB followed a cyclic approach for step-by-step improvement of alarm systems. Following delivery of the alarm philosophy document to the client and prior to an initial workshop, ABB delivered training to the client's team to explain the alarm management process and to ensure a common understanding for the workshops.

The ART application was configured in accordance with the client's alarm philosophy, to correctly define the alarm design criteria, alarm priorities and consequence tables. The existing alarm configuration was exported from the control system into excel spreadsheets and these were then imported into ART. The Alarms were then reviewed and analyzed in a series of workshops to ensure that the alarms were relevant to the operator and that there was time available to take corrective action and bring the process under control.

Where no operator response could be defined or there wasn't sufficient time to take corrective action, the alarms were removed or demoted to an alert or event. In order to make the workshops more efficient and optimise the effort for all concerned, ABB uses the concept of 'unique alarms'. A unique alarm is an alarm that can be assessed once and then copied to other alarms on similar equipment on similar duties, thus reducing project time and costs. The KPIs in IEC 62682 and EEMUA 191 recommend one alarm every 10 minutes (144 a day) per operator (in stable operation), The alarm data provided by the customer indicated that the alarm system was generating between 200 and 1400 alarms per day.

This level of alarm load has been recognised as a contributing factor to operator stress and reduced confidence in the alarm system. Where the operator is overloaded with too many alarms, the operators simply react and will not have the time to investigate the alarm and implement the required trouble shooting and remediation actions detailed in the Alarm Response Manual (ARM). By rationalizing the alarms in the Master Alarm Database (MAD) and correctly categorising alarms in accordance with the alarm philosophy, this results in a more stable alarm system that can be used to support the operator and allows operators to focus on running the plant more effectively.

The alarm data provided by the customer identified that the top 20 alarms accounted for 92% (22734) and 81% (16685) of the total alarm load. In ABB's experience this is quite common for many process control systems, where the alarm system requires rationalization

In this assignment, ABB prioritised the top 20 alarms as part of the alarm rationalization process and 13 of the top 20 alarms were demoted to events and alarm conditioning was applied to the remaining 7 to make the alarms more stable and reduce repeat alarms.

Remote delivery as the 'new way of working'

For this assignment, ABB experts visited the on-shore facility for three days in early 2020 to hold preliminary training and to approve the draft alarm philosophy. ABB had to re-think the delivery strategy. However, thanks to previous successful remote collaborations, ABB completed the rationalization activities remotely using Microsoft Teams to run the necessary review meetings. The project took between two to three months to complete, with one consultant working full time to ensure consistency, progress and quality of resolution.

ABB UK now emphasize that the technical approach for both remote and face to face, in-country delivery is identical and that whilst remote working was initially prompted by COVID-19 travel restrictions, both ABB UK and the customer have not only found that it has worked successfully, it presents significant advantages both operationally and economically. In addition to the cost savings associated with travel and expenses, the customer have found that remote working provides a greater flexibility in that they are not required to gather their entire team in one location for a fixed period of time. It also enables the workshop duration and scheduling to be adjusted as necessary (sometimes at short notice) to resolve any issues arising during the workshops (that might otherwise effect progress) and allow the client team to address any plant issues.

Customer feedback / benefit to customer

Feedback from the customer confirms they were delighted with what ABB delivered in terms of successful remote collaboration and the alarm rationalization process that resulted in a reduction of configured alarms and the use of appropriate alarm conditioning. This has facilitated additional follow on work for the customer's other operational sites moving forward

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