

Don't be alarmed! - Effective control system analysis



ABB help Rashpetco gain over \$2 million USD per annum in extra production by applying good alarm management practice.

Rashid Petroleum Company (Rashpetco) is the key supplier of gas for both domestic consumption and as a feedstock to local LNG plants exporting around the world. Frequent production issues during recent years had prompted a number of reviews of systems and procedures, equipment, and facilities. One such review was carried out on the alarm system where the number of alarms being presented to the Control Room Operators (CRO's) was well outside the guidelines defined in EEMUA 191, the internationally recognised guide to good practice in alarm management. This was identified as a key problem both for maintaining production and for improving safety.

A number of previous attempts to reduce the number of alarms had proven to be unsuccessful and failure to respond to alarms had been implicated in a number of compressor trips that resulted in production losses. Given the need to review this issue, personnel from Rashpetco attended ABB's alarm management training course and, as a result of this and recommendations from other ABB clients, commissioned ABB to undertake an 'Alarm system health check study'.

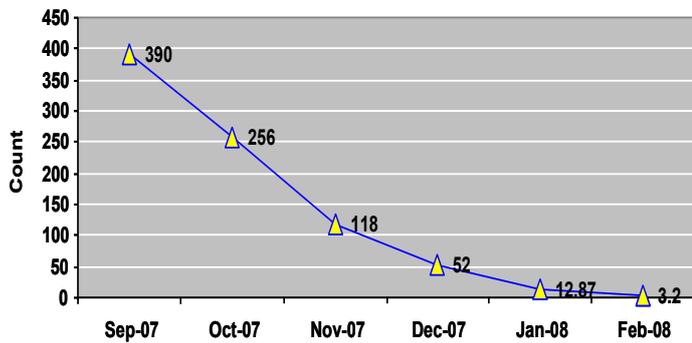


Figure 1: WDDM facility average alarm rate Sep 07 - Feb 08



Alarm management project team - Rashpetco & ABB personnel

Benefits

- The delivered total project payback to Rashpetco was within 3 months and to quote Rashpetco: "This is what success looks like. WDDM alone had 6 trips in 2008 compared to 25 in 2007, and 17 in just the second half of 2006. This has a significant business value" (estimated to be in excess of USD 2m per annum in extra production)
- Alarm rate was reduced from 390 alarms per 10 minutes to 2 alarms per 10 minute period on the WDDM facility and to below 1 per 10 minutes on the Rosetta plant
- A number of alarms, including a number of duplications, were either removed or re-categorised as events
- Adherence to EEMUA 191 guidelines
- Alarm priority easier to distinguish through alarm prioritisation programme to give each priority its own audible tone and colour code.
- Knowledge transfer through training courses
- A consistent approach to alarm management

Solution

The health check study report detailed a list of recommendations for action, and concluded that the remedial work was urgently required because Rashpetco did not have an effective alarm system. ABB were subsequently asked to lead a project team made up of instrument, production, safety, process and DCS system engineers through a review of all the alarms generated by the control system.

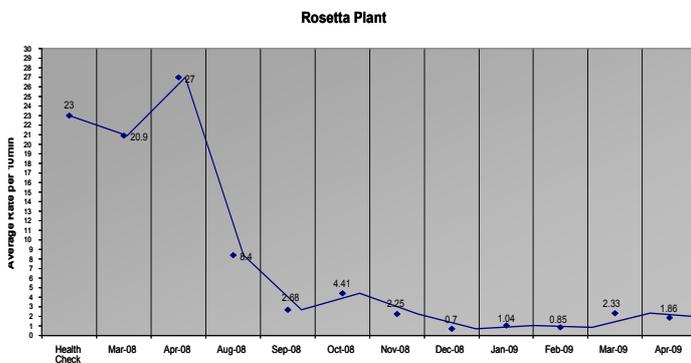


Figure 2: Rosetta plant average alarm rate Mar 08 - Apr 09

The exercise focused on the experience and knowledge gained from plant operations since the start of 2001 to prioritise each alarm, verify each alarm threshold and check the control setting for each instrument. As a result a number of alarms, including a number of duplications, were either removed or re-categorised as events.

ABB's improvement strategy included the following project items:

- The control system was modified to distinguish the priorities when presented to the Control Room Operative's (CRO's) on both the graphic displays and the alarm and event lists. Each priority has its own audible tone and colour code to enable the CRO's to identify the alarm and therefore react appropriately for the level of priority. In total, some 20,000 alarms were prioritised as part of the review process based on their significance in terms of safety, environment, financial factors and the time available to the CRO's to take action
- Automated mechanisms were developed by ABB to download the changes from a database directly to the DCS controllers in order to implement the large number of changes resulting from the review process. This download was successfully completed without incident or production loss over two days while the plant was in operation, although a small number of critical changes were undertaken manually to maintain security of the system
- It was of paramount importance to Rashpetco that the knowledge gained whilst carrying out this remedial work was not lost once the ABB specialists left site. ABB developed and then delivered a training course for the local engineers and other plant personnel in the practical requirements of good alarm management practice
- A design strategy document specific to the control system was developed to ensure consistency of approach when modifying existing alarms or adding new alarms to the system. This document is now given to all new projects to manage alarm system requirements
- An alarm management strategy document was developed to ensure that management requirements including roles and responsibilities, alarm reviews, performance targets, measurements, training, etc. are documented, reviewed, and revised as necessary.
- These two documents are based on the guidelines in EEMUA 191 and will ensure that valuable design and maintenance information is maintained during the lifecycle of the plant

An ABB SmartLogger / SmartClient alarm monitoring tool was installed for the WDDM facility to provide ongoing analysis of the alarm and event data produced by the Data Historian. This helped ABB / Rashpetco to identify and prioritise further problems in both the base alarm load and peak alarm load. As an example, the system's performance was subsequently compromised by the addition of further subsea wells as the facility was developed and ABB were able to identify a targeted plan of improvement by implementing a combination of:

- Intelligent alarm handling facilities
- The grouping of common alarms

An important project aim was to reduce the peak loading of alarms during plant trips or equipment failures and reduce alarm rates to manageable levels whilst being careful to ensure that important alarms were still visible and not hidden from the CRO's.

One of the key performance targets of the project was to reduce the rate of alarms being presented to the CRO's down from its initial rate of 390 alarms per 10 minutes to below 3 alarms per 10 minutes. This was achieved and bettered with the alarm rate reducing to 2 alarms per 10 minute period (figure 1).

ABB were subsequently commissioned to undertake a similar project on an adjacent plant (Rosetta) as a direct result of the successful work already carried out on WDDM. The same approach and delivery mechanism were used throughout this second project which again resulted in significant alarm number reductions to below 1 per 10 minute period (figure 2). On completion of the assignment, Rashpetco accepted all of the recommendations made by ABB and have since commissioned ABB to provide alarm system specialists to work alongside their own staff to implement a programme of further remedial action as quickly as possible.

For further information please contact:

ABB Engineering Services
 Daresbury Park Business Centre
 Daresbury
 Warrington
 Cheshire, WA4 4BT
 United Kingdom
 Phone: +44 (0)1925 741111
 Fax: +44 (0)1925 741212
 E-Mail: contact@gb.abb.com

www.abb.com/consulting

ABB provides technical consulting and engineering services to improve performance in the areas of compliance, operations and engineering to customers in the chemical, petrochemical, oil & gas, power, pharmaceuticals, metals and consumer industries worldwide.