



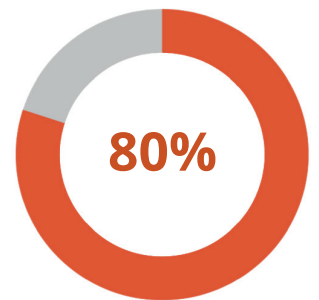
# Don't get driven to distraction by nuisance alarms

## The Problem with Nuisance Alarms

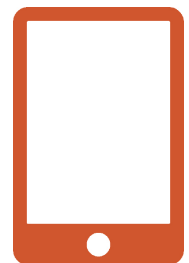
A well-managed alarm system can reduce risks and enhance the safety of plant operations. The alarm system is often the first line of defense that helps avoid serious process incidents - an indispensable component of process control that attracts the attention of process operators to any abnormal conditions in the plant. However, in practice, many process plants suffer from poor alarm system configuration which leads to nuisance alarms and alarm floods. These compromise safety and inhibit the effectiveness of process operations, due to operators missing important alarms. This is a problem for organizations who struggle with operational clarity and consistent performance in their day-to-day operations.

Alarm systems that have not received the appropriate attention and resources, or have been poorly configured, often encounter the issue of nuisance alarm. These are alarms which are triggered when either no abnormal condition exists, or when no operator action is required. Such alarms are given little or zero credibility by the operators and are often ignored or disconnected. This can lead to doubts about other alarms in the system, reduce the confidence of operators in the alarm information, and potentially distract them from important alarms. To improve this situation, competent individuals and subject matter experts review every alarm in the system, organized in terms of priority, so that the important work is tackled first.

A large petrochemical producer in Asia wanted to monitor alarm system performance with the ultimate goal of reducing their alarm count and minimizing the distraction of nuisance alarms with better plant data visualization. They are the largest producer of Phthalic Anhydride in the region. Phthalic Anhydride (PAN) is used in industries such as flexible PVC, plastics, paints, construction, transportation and marine.



Reduction in  
Nuisance Alarms



**iPad Portability**  
Provides KPIs and  
Reports for Business  
Improvements

They wanted to segregate their plant data and alarms and events for their two plant processes, Maleic Anhydride (MA) and PA Phthalic Anhydride.

To facilitate performance gains, they identified some key performance indicators on their alarm system. This required access to data and autonomous reporting capabilities for their alarms and event data that could be easily shared and distributed, providing an overview of alarm performance for the senior management team. As with many process plants, they required streamlined access to these KPIs and reports, accessible on desktop and portable tablet devices on the business domain that allowed for quick and convenient access to system data to display layout of process.

By closely monitoring alarm system data and taking actions to resolve concerns, it will help the business deliver superior quality products and expand the production capabilities to stay ahead in a highly competitive industry.

## Solution

A healthy alarm system provides operational transparency that optimizes day-to-day operations and provides a solid foundation for more consistent performance and expanded production capabilities. Yokogawa was approached by the customer to identify solutions to help monitor the alarm system performance and pinpoint areas of concern that were specific to their process requirements.

With Exaquantum, Yokogawa's Plant Information Management System provides a flexible and adaptable solution that collects important process values which can be stored and monitored over time. It also provides the investigative capabilities to assess alarm system performance with the Alarm Reporting and Analysis application (Exaquantum/ARA). This versatile solution allows the customer to select and combine the respective reports from the plant information system as well as the alarm reporting system, whichever is most appropriate for their requirements. The alarm and reporting package includes a number of KPI reports that are generated on the production system that conform to alarm industry standards (EEMUA 191 Edition 3, ISA 18.2 2016, IEC 62682).

Eleven reports have been identified to help reduce the alarm count and lower the number of nuisance alarms that are presented to the operators. This approach enables the customer to use performance measures to identify nuisance alarms which occur most frequently and are most likely to trip and gradually work through these systematically and take the necessary corrective actions.

With an intuitive and user-friendly web user interface, data, mimics and automatic reports are seamlessly produced for their KPIs on their alarm system, providing enhanced visualization on iPads and desktop devices on the business network. To streamline data access and communication, the solution generates reports automatically that can be used by senior management wherever there is an internet connection.

Deployed on an existing Yokogawa distributed control system on site, the integration and configuration was straightforward with minimal issues that was completed in phases. This allowed for Tag lists extracted from the CENTUM VP engineering workstation databases to be directly imported and configured for the alarm reporting package (Exaquantum/ARA).

## Benefits



### Alarm Count Reduction

A well-designed alarm system results in a safer and more cost-effective operation. Reducing the total number of alarms that are annunciated to the operator is one approach that provides huge gains in a relative short time frame. Exaquantum/ARA was used to identify 80% of their nuisance alarms thus reducing the load on operators in the control room. The Bad Actor report identified repeatedly occurring alarms over a selected period of time, displaying the Tags with highest alarm counts. The Top 20 Alarms report helped the customer to determine the most frequently occurring alarms for each area.

### Improved Data Visualization

Providing access to plant data at the right level and time can help key decision makers to understand the current situation and overall plant performance. By providing in excess of 100 web graphics and eleven reports, it helped end users with better plant data visualization (aided by graphics and reports) for the KPIs with live and historic data. Understanding data trends and the relationships that co-exist, it can help optimize and re-engineer processes to drive efficiencies and allows operators to quickly spot issues and take corrective actions to maintain consistency.

## Project Background

Yokogawa had already established a good working relationship with the end customer, with a pre-existing installation of CENTUM distributed control system for both the Maleic Anhydride and Phthalic Anhydride sections of the plant. It was an obvious choice for the customer to select Yokogawa as partner to reduce the alarm count with better plant data visualization. There were a number of pre-requisite specifications that were defined at the start of the project:

### Data Collection through Exaopc

By utilizing an existing Exaopc gateway, it could seamlessly interface with Exaquantum for the raw and aggregated process data and the collection of alarm and event messages for KPI reporting.

### Long Term Historical Storage

Exaquantum provides a tool to collect and store historical process data and alarm and events through organized and well-structured data. This provides improved visibility of important

and valuable plant information, with additional value added applications that deliver measurable benefits and performance insight.

### KPIs and Reports

To improve data visualization, raw system data needed to be transformed into specific reports and KPIs that could be used across the organization including the senior management team.

### **Automatic Report Generation and Email**

Senior Management required access to alarm KPI reports to assess the current state for alarm reduction. The reporting tool in Exaquantum allows for interactive data and reports to be emailed to key members and users to keep them well informed and notified of any changes in performance.

### **Data Access – Anytime, Anywhere**

It was important for users to have access to reports via an iPad, allowing the senior management team to have access to KPIs and reports regardless of their location. They required secure access to the Exaquantum data on their iPad from anywhere through the designated public IP address via internet connection.

## **Project Scope**

### **Plant Control System**

- Installed on a Yokogawa Distributed Control System (DCS) CENTUM VP R5.
- Additional planned sections are being considered for the future with opportunities to expand this solution including potential third party systems.

### **Installation & Commissioning**

Supply and Engineering of the following:

- Exaopc R3.77.
- Tag list extracted from Centum/VP Engineering Station database for configuration and importing into Exaquantum/ARA Configurator.

### **Exaquantum Software packages and modules**

- Exaquantum PIMS (3,000 tags 2 x explorer, 10 x web client) - Installed with Windows server 2016 standard operating system, MS-Office 2016 32 bit software & MacAfee antivirus.
- Exaquantum Alarm Reporting and Analysis (Exaquantum/ARA) - 11 KPI reports are being generated on the Exaquantum/ARA production system.
- Exaquantum Report Manager (Exaquantum/RM) - Automatic Report generation has also been facilitated using this application.
- Exaquantum Graphic Conversion Tool - Converts imported CENTUM VP graphics into Exaquantum/Explorer and Exaquantum/Web graphics.

### **Web User Interface**

- Visualizing Exaquantum Web Trends, Mimics and Exaquantum/ARA reports.
- Apple iPads running iOS 12 as well as desktop PCs.

## Implementation and Commissioning

Implementation and commissioning of this project was undertaken with a two phased approach.

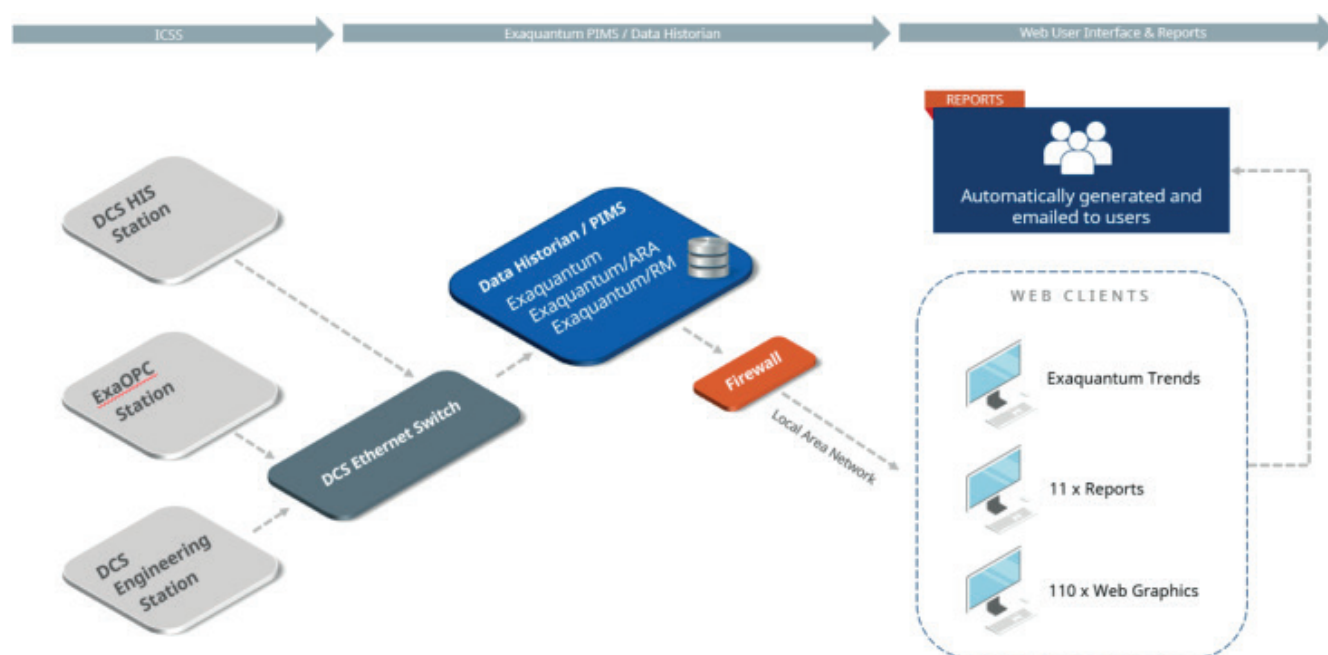
### PHASE 1

- The Exaquantum Server was installed with Windows Server 2016 standard operating system, MS-Office 2016 32 bit software & MacAfee antivirus.
- Exaquantum PIMS R3.10 was installed with combined server software successfully.
- The Exaopc Server was installed with Windows Server 2016 standard operating system.
- Latest Version of Exaopc R3.77 was installed.
- Communication between Exaopc and Exaquantum Server was established.
- Firewall was configured by the customer and communication between clients and Exaquantum Server was tested.
- Exaquantum PIMS Main Software R3.10 functional checks on Exaquantum Server machine was carried out successfully.
- The Exaquantum Administration and Configuration was checked on the PIMS Server including data updates of all tags.
- Exaquantum PIMS Server software licenses were installed for 3,000 tags and 10 web clients including two Explorer clients.
- Data retrieval and updates in (Trends, MS-Excel Reports and Graphics) in Exaquantum Explorer client PC's & Web client PC's and iPads was tested.
- 110 Web graphics and 24 Excel reports have been generated as per the inputs provided by customer and uploaded to the Web Server.

### PHASE 2

- Exaquantum/ARA and Exaquantum/RM R3.10 software packages installed.
- Tag lists were extracted from Centum/VP Engineering Station database for configuration and importing into the Exaquantum/ARA Configurator.
- Various Exaquantum/ARA KPI reports are being generated on the Exaquantum/ARA production system.
- They are visualizing Exaquantum Web Trends, Mimics and Exaquantum/ARA reports on iPads (iOS 12) and also on desktops.
- Automatic Report generation has also been facilitated using Exaquantum's Report Manager package.
- Reports emailed to Google based email accounts that required additional support configuration.
- Provided detailed training sessions to enable the customer to design and choose the respective reports from Exaquantum system as well as Exaquantum/ARA system for emailing and visualization on their desktop and tablet devices.

## System Architecture



## Key Takeaways

### Reduction in the number of alarms

Comprehensive reports produced by the alarm reporting package enabled the customer to identify and systematically work through frequent nuisance alarms in order to reduce the number of alarms presented to operators by 80%. By significantly reducing the number of alarms, it can lesson operator stress and allows more time to consider and address more important alarms which may have been previously overlooked.

### Enhanced data visualization

Exaquantum is a plant information management system that collects, stores and processes process data and alarm and events data simultaneously. By utilizing in excess of 100 web graphics and eleven alarm analysis reports, this user-friendly application allows operators to design and combine relevant reports to fulfil their requirements, highlighting key KPIs with live and historic data. Having this information readily available provides operators with the tools to quickly spot issues and take the corrective actions to achieve operational consistency.

### Data on the go for senior management to take decisions

The needs and requirements for senior managers of process plants are constantly changing and they need access unrestricted access to key operational information anytime and anywhere, supported by portable devices and tablets. Exaquantum's web user interface provides support for tablet devices and iPads that enabled the senior management team to access information regardless of their location. With more freedom and flexibility to access plant data with improved visualization of important process information and KPIs to enable a more streamlined approach to production management. Senior managers are now notified and informed if any changes to performance occur, allowing them to take the corrective actions to maintain swift and efficient operations.