General Specifications

Model NTPC011
Exaquantum Safety Function
Monitoring

Exaquantum

GS 36J40B20-01EN

■ PROBLEM

Industrial processing facilities are coming under mounting pressure to adhere to regulations requiring them to monitor their safety performance, produce detailed reports and support the ongoing assessments of their safety regime. This is a manual process that can be difficult to manage effectively. Omissions in the safety performance evidence can lead to punitive measures and enforcement notices from the regulatory authorities and increases the exposure to liability with major business impact. Industrial processes may include large and/or complex Safety Instrumented Systems, the performance of which has to be assessed. A means to efficiently monitor these systems in an effective way which satisfies both technical authorities and regulators is desirable.

■ SOLUTION

Exaquantum Safety Function Monitoring (Exaquantum/SFM; hereafter referred to as 'SFM') is Yokogawa's Safety Function Monitoring solution. SFM is a management tool developed to monitor safety performance in response to the growing pressure from regulations and legislation regarding safety reporting and assessments. SFM collects, processes and presents safety data to enable monitoring and analysis of key safety KPIs such as SIF (Safety Instrumented Functions) activations, ILPs (Independent Layers of Protection), initiating causes and overrides. This information assists users to:

• Verify operational safety performance
• Identify safety issues
• Reduce maintenance activities
• Improve safety solution designs

■ BENEFITS

• Increased user efficiency and accuracy by quickly identifying safety events such as SIF Activations, Overrides/Inhibits and Protection Layer Availability
• Improved and preventative planning of maintenance activities by identifying SIF Activation test results as replacements for scheduled tests
• Increased visibility of testing by incorporation of Partial Stroke Test (PST) results from Yokogawa's 'PRM' (Plant Resource Manager)
• Improved identification of possible safety issues by active benchmarking of safety performance against design expectations
• Reduced risk by identification of issues not recognized in the safety design
• Reduced effort for generation of safety design validation information to support activities of regulators and technical authorities
• Improved user capability by providing access to relevant information contained in a single database

■ KEY FEATURES

• Overviews of the key safety KPI information including SIF activations by category, SIF output failures (devices), overridden SIFs and active ILPs
• Monitoring of LOPA (Layer of Protection Analysis) through mapping SIS (Safety Instrumented Systems) elements against the LOPA 'Initiating Cause' assumptions which can be compared to the SIS base data for verification
• SIF device(s) activation monitoring
• Non-SIF device(s) actuation monitoring
• Override/Inhibit monitoring
• Dynamic reports that can be periodically generated and exported

■ INTRODUCTION

SFM is an integrated, plant-wide solution for safety monitoring that:

• Provides an analysis and reporting tool to help monitor the performance effectiveness of their defined SISs against design targets
• A management tool that can be used to review data from the safety systems, control systems, and risk analysis from HAZOP, LOPA, etc.
• Displays and reports that can assist in the identification of abnormal events and causes, or safety activations suitable for test replacement, which can streamline the analysis process
• Can be used to intelligently monitor the correlated information which is independent of system vendor

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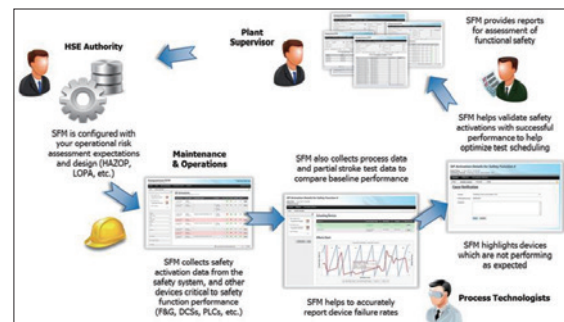
■ CAPABILITIES

Data Collection

The underlying Exaquantum historian provides SFM with a powerful, integrated, cost-effective platform for collecting and storing data from different sources via OPC DA, OPC A&E and OPC HDA independent of the system vendor. OPC HDA has been expanded within Exaopc (Yokogawa's OPC server) to allow historical Alarms & Events to be recovered following a communications interruption.

Risk Assessment (HAZOP, LOPA)

SFM is configured with the safety design expectations derived from the HAZOP and (if conducted) LOPA risk assessments. This information is compared against the actual operational safety function activity that assists users in highlighting issues, helping to support the validation of safety demand rates and can help to optimize test scheduling. These findings can then be checked and verified against the base data within the defined SIS.

Web User Interface

SFM provides secure web based displays and reports for user access from local or remote locations and does not require any client software to be installed.

SIF KPI's

An overview of user filtered SIF KPIs is provided, allowing users to monitor and view the following information:

• SIF Overview by Safety Integrity Level
  - Number of SIFs
  - Number of SIF activations
  - Number of SIF output faults (device failures)

• ICSS (Integrated Control and Safety System) ILP Overview by Integrity Level showing both the number of currently inactive and user filtered date/time inactive ILPs

• MOS (Maintenance Override Switch) Overview by Integrity Level showing both the number of SIFs currently in Maintenance Override and user filtered date/time SIF Maintenance Overrides
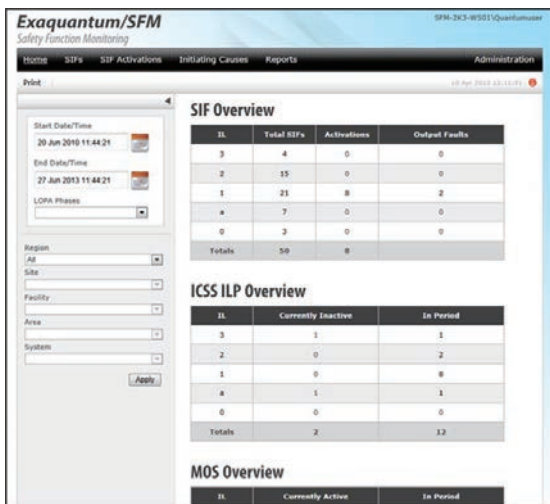
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Identification of SIF Activations

SFM provides comprehensive Alarm & Events monitoring capabilities to assist management in the identification of SIF Activations. These activations are then converted into Reports, Overview screens and SIF Activation lists, all of which provide users with a clear picture as to which SIFs have activated, and more importantly, which activations can be assessed and verified against the SIS base data.
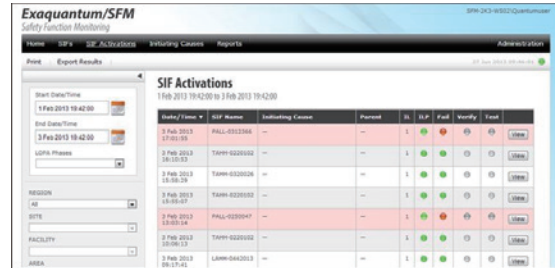
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SIF Activation Analysis

When SIF Activations take place, SFM records key associated data that can be used to better understand the effect of the activation.

SFM records the following information:

• Associated safety device transitions and travel times to determine the travel times of the devices when activated, versus the expected design times as defined in the safety design
• Related process information (pressure, temperature, etc.) is recorded and trended before, during and following the activation. This process information can be compared against baseline data to show variations in the profile signature of any process data deviations
• Actuating device starts and stops are overlaid onto process data trends making it easy to view changes in trends before and during device transitions

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SIF Activation Verification

SFM can be used as a mechanism to show which SIFs have been activated, which can then be verified against the SIS base data. This verification process establishes the SIF Activation reason(s), which is also known as the 'Initiating Cause'. The Initiating Cause(s) are derived from the safety design and imported into SFM. When an Initiating Cause has not been identified in the safety design, SFM allows a new Initiating Cause(s) to be defined that is displayed in various SFM reports. These reports can verified against the safety design to initiate improvements.

Initiating Causes

SIF Initiating Causes are monitored against the safety design. This provides a valuable understanding of the actual demand versus the expected demand. The SFM traffic light system provides users an early warning sign when Initiating Causes have exceeded their expected design frequency.

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Monitoring Overrides and Inhibits

SFM monitors SIF overrides, inhibits and their protection layers. This provides critical information in the understanding of SIFs having sufficient protection and are maintaining their designed SILs.

Safety Reports

SFM provides dynamic reports for all information displayed on the web interface with the ability for users to select fields and drill into data as well as filtering and sorting by almost all fields being displayed.

Reports contain SIS information for the following areas:
• SIF Activations
• ILP Availability
• Device Actuations
• Overrides and Inhibits
• Initiating Causes
• SIF Masking

Reports can be exported to multiple formats (such as Excel, Word and PDF) and scheduled to be emailed at configurable periods.

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■ HARDWARE AND SOFTWARE REQUIREMENTS

Minimum Hardware and Software Specifications

Component	Minimum Hardware and Software Specification
Exaquantum/SFM Server	For detailed specification information, refer to the following description in "Exaquantum GS (GS 36J04A10-01E)." Hardware: ● Hardware Operating Environment "Exaquantum Server" Software: ● Software Operating Environment "Exaquantum Server" For detailed supported revision, please refer to "GS 36J40W10-01EN."
Exaquantum/SFM Web Server	For detailed specification information, refer to the following description in "Exaquantum GS (GS 36J04A10-01E)." Hardware: ● Hardware Operating Environment "Web Server" Software: ● Software Operating Environment "Exaquantum Web Server" For detailed supported revision, please refer to "GS 36J40W10-01EN."
Exaquantum/SFM Web Clients	For detailed specification information, refer to the following description in "Exaquantum GS (GS 36J04A10-01E)." Hardware: ● Hardware Operating Environment "Exaquantum Use PCs" Software: ● Software Operating Environment "User PCs for Exaquantum/Explorer, Exaquantum/Web Client" For detailed supported revision, please refer to "GS 36J40W10-01EN."

If SFM will be installed on a different version of Exaquantum, please contact Yokogawa for assistance.

■ MODELS AND SUFFIX CODES

Exaquantum/SFM Product

		Description
Model	NTPC011	Exaquantum/SFM Product
Suffix Codes	-S	Basic Software License
	1	New Order (with Media)
	1	English version
	-SV□	Enter the number of Exaquantum/SFM Server Licenses (1 - 9)
	-YYY	Select an Option Code
Option Code	/WC□	Enter the number of new or additional per-seat Exaquantum/SFM Web Client Licenses (1 - 9)

Maintenance Service for Exaquantum/SFM

		Description
Model	SV3NTMC011	Maintenance Service for Exaquantum/SFM
Suffix Codes	-S	Annual Contract
	1	Always 1
	1	Always 1
	-SV□	Enter the number of Exaquantum/SFM Server Licenses (1 - 9)
	-YYY	Select an Option Code
	-N	New
	-R	Renewal
Option Code	/WC□	Enter the number of per-seat Exaquantum/SFM Web Client Licenses (1 - 9)

■ ORDERING INFORMATION

Specify model and suffix codes.

■ TRADEMARKS

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