Exaquantum delivers Production Excellence
Production Excellence

Yokogawa’s VigilantPlant Solutions enable continuous improvements in production environments to provide Asset Optimization, Production Agility and Flexibility, Quality Optimization together with Safe and Secure Operations.

**Functional Solutions**

- **Production Management**
  - Plant & Enterprise Historians
  - Data Visualization Dashboard
  - Performance Monitoring
  - Production Accounting
  - Batch Production Management & Reporting

- **Data Integration**
  - Down-Time Analysis
  - Yield Accounting
  - Environmental Monitoring
  - Mass & Energy Balancing
  - Data Reconciliation

- **Alarm Management**
  - ISA 18.2-2009 & EEMUA 191 based Alarm Reporting, Management & Analysis
  - Sequence of Events Recording
  - Alarm Master Database

- **Safety Management**
  - Sequence of Events Recording
  - Trip Analysis
  - Safety Function Monitoring
  - Valve Monitoring

- **Energy Management**
  - Operational Cost & Performance Optimization
  - Power & Performance Calculations
  - Utility Management
  - Performance Visibility

- **Operator Effectiveness**
  - Electronic Logbook
  - Production Execution & Instruction
  - Performance Monitoring

**Industry Solutions**

- **Oil & Gas Production**
  - Remote Performance Monitoring
  - Subsea Valve Performance Monitoring
  - Safety Function Monitoring
  - Operator Guidance

- **Oil & Gas Midstream**
  - Pipeline Monitoring
  - Energy Management
  - Material Monitoring
  - Leak Detection

- **Refining & Petrochemicals**
  - Mass/Energy Management & Data Reconciliation
  - Utility Management
  - Offsite Movement Monitoring
  - Operational Cost & Performance Visibility

- **Chemicals**
  - Batch Production Management & Reporting
  - Down-Time Analysis
  - Performance Based Maintenance Scheduling

- **Power & Energy**
  - Power Performance Monitoring
  - Power Plant Performance & Cost Optimization
  - Captive Power Operational Optimization
  - Fuel & Utility Management

**Additional Features**

- Global System Integration
- Business & ERP Integration
- Laboratory & Quality Information Integration
- Maintenance & Asset Management Integration
- Remote Facility Integration
- Standards Based Integration (ISA-95, OPC)
- Legacy System Integration
- Web Services
Production Management

Exaquantum

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Standards-based Plant Information Management System that combines data histories for real-time and historical data, providing a centralized repository for data related to the plant, providing KPIs, aggregations, role-based views, graphical interfaces, trending, and reports with integration with different systems.

Benefits: Integration and enhancement of process data into timely actionable information available across the enterprise.

Exaquantum/mPower (Production Accounting)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals.

Functionality: Key production information for enterprise profitability and planning. A platform for scalable production reporting on material intake, consumption, production yield, and waste. The plant takes into account environmental impact of actual asset flow/production values to calculate carbon footprint.

Benefits: Optimal stock management. Early detection of missed production targets. Auditability for the automated creation and management of production accounts reports.

Exaquantum/Batch

Industry: Oil and Gas Midstream, Pharmaceuticals, Chemicals.

Functionality: Scalable ISA-88 based Batch Information Management System which collects and stores batch production, equipment and recipe information for tracking and analysis.

Benefits: Improved batch monitoring and utilization; Total visibility of all relevant information for key stakeholders; Key contribution for quality improvement programs; Support for FDA 21 CFR Part 11.

Visa-OM (Movement Monitoring)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals.


Benefits: Effective management and supervision of idle or non-automated tank farm facilities; Assist contamination by tracking material and asset usage through early warnings.

Exaquantum/DTA (Down-Time Analysis)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Automatically captures plant data to enable Down Time analysis to be carried out by recording times when plant equipment is not running (Down Time) and production figures which are less than the Maximum Sustainable Production Rate (Rate Limits). Reasons can then be assigned to these events to add context. The statistics including support for Overall Equipment Effectiveness (OEE) are then operational decision making process with a view to minimizing plant loss and maximizing future production.

Benefits: Continuous plant availability improvement through increased awareness of Down Time and Rate Loss within the process operating and equipment dynamics. Prioritized maintenance by identifying the causes and effects of production loss. Inaccuracies removed through automated data collection, maintenance by identifying the causes and effects of production loss.

Exaquantum/AMD (Alarm-Meter Database)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Power and Energy.

Functionality: Centralized database for all alarm settings and documentation with alarm metrics providing a comprehensive view of the overall alarm system performance. Comprehensive management of change and auditing is required to be in the alarm definition, rationalization and approval processes. Alarm settings can be validated against permissible limits and enforced.

Benefits: Ensures that all changes to alarms are to specification with high integrity and consistency; Ensures the alarm definition, rationalization and approval processes; Provides full auditing for regulatory compliance.

Exaquantum/SER (Sequence of Events Recorder)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Power and Energy.

Functionality: Integrated and unified sequence of event information stored in an open and portable database. This determination based upon specific plant conditions providing a full log of all relevant process information in the crucial period before and after a plant event.

Benefits: Plant wide integrated view of Alarms & Events; Plant cause analysis, problems and problem identification; Assist in the elimination or reduction in the number of unexpected incidents and trips.

Exaquantum/ARA (Alarm Reporting & Analysis)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Comprehensive set of statistical reports and KPIs based upon ISA 88.2-2008 and EMUA 191. Alarm and Events can be aggregated by pig header, plant shift, week, month, quarter and year providing alarm rates, counts, peaks, duration, etc.

Benefits: Reduction in the number of unwanted and distracting alarms allowing operators to react faster to abnormal situations with the proper operator action, resulting in a safer and more productive plant; Improved plant safety, reduced environmental risk, and enhanced maintenance response; Reduction in the amount of equipment damage; Reduced operator stress; Information available to key stakeholders on demand and by emails facilitating efficient and timely decision making.

Alarm Management

Exaquantum/GF (Graphical Framework)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Enhanced framework for the Exaquantum/Exploter Graphical User Interface providing graphical display, history replay, for example hourly, integration of additional process information, user configurable trend groups and links to frequently used functions.

Benefits: Enables quick access to relevant information; Reduced configuration time for graphics and trend groups; Improved analysis using the historical replay facility.

Safety Management

Exaquantum/SFM (Safety Function Monitoring)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Power and Energy.

Functionality: Plant-wide monitoring, analysis and reporting. Integrates with upstream performance, across safety systems (SIS) and devices (sensors, actuation). Operational data from system and device activity is mapped against LOPA or HAZOP risk analysis to report the effectiveness of actual safety performance against the design targets. Deviations from safety design specifications are also monitored and reports maintenance test replacements with successful field safety activations by assisting validation.

Benefits: Improved operational safety. Visibility of safety performance at both system and device level; Identify and reduce operational risk; Significant reduction in time and effort to produce regulatory reports; Provides comprehensive information for safety validation and improvement programs.

Exaquantum/SSP (Subsea Portal)

Industry: Oil and Gas Production.

Functionality: Monitoring of the health of subsea wells though continuous monitoring and presentation of down hole temperatures and pressures, acoustic sand data and mechanical parameters. Integrates with upstream process equipment. Provides a comprehensive view of the entire well, comparing historical with ideal and previous profiles, and combined with alarm information and well production data to assess.

Benefits: Improved operational decision making through integrated and timely information; Early indication of maintenance needs to prevent safety, environmental and production incidents.

Exaquantum/OSA (Overhead Safety Assist)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Provides a view of the safety integrity of the plant. Alarms provide the ability to assess the impact on the safety level of the facility when instruments require overriding. Authorization levels allow permission to be granted before an override is implemented.

Benefits: Overall device and plant safety of the plant; Improves safety risk analysis before the override is implemented. Assists in the enforcement of operational procedures. Provides a full audit trail for accountability, post analysis and safety improvement processes.

Exaquantum/OTM (Operator Training Module)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Provides long-term trending of process data combined with alarm and events system wise and user specific trend groups provide quick and easy access to important process information.

Benefits: Improved operator performance and safety by helping operators to identify changes in plant behavior that require attention.

Energy Management

Exaquantum/PCC (Power Performance Calculations)

Industry: Oil and Gas Production, Chemicals, Power and Energy.

Functionality: Calculates the efficiencies of primary and auxiliary processes such as boilers and turbines, and overall plant efficiency. Standard templates containing process data and configuration blocks on the ASME PTC are provided which can be defined for specific plant operations, configurations. ‘What-if’ analysis provides the ability to examine different plant operating scenarios and the impact.

Benefits: Performance HPs are available in real-time to all relevant users; Bottlenecks and performance deficiencies in key plants can be quickly identified; Identification of optimal operating conditions.

eLogBook (Electronic Logbook)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Advanced computer-based replacement for traditional control room paper based log books enabling the capture of observed and non-observed information and tracking.

Benefits: Consolidation of key automated and non-automated information that requires tracking until completion; Improved with handovers through clear status and task assignment, and management reporting.

Exaquantum/RM (Report Manager)

Industry: Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals, Power and Energy.

Functionality: Reports can be created through Microsoft Excel and then scheduled on demand or periodically; Weekly, monthly, etc. Reports can be saved as web pages, Excel files, and PDFs.

Benefits: Timely creation and distribution of reports, including reduced manpower in the production of regular reports; Management of reports and auditing.
### Data Integration

**Exaquantum/MDX** (Manufacturing Data Exchange)

- **Industry:** Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals and Power and Energy.
- **Functionality:** Provides the integration of ERP (Enterprise Resource Planning) systems such as SAP and control systems using the ISA-88 standard. Configurable web services enable the business loop to be closed providing integration of production requests, production status and results, equipment status, KPIs and alerts.
- **Benefits:** Enables transfer of process and alarm data between one or more Exaquantum servers via satellite, microwave, internet, etc. Secure transfer of process data over unreliable or slow network links. Integration of process information over a wide geographical area. Facilitates the centralisation of key information for easy access to subject matter experts.

**Exaquantum/ADX** (Asset Data Exchange)

- **Industry:** Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals and Power and Energy.
- **Functionality:** Transfer of key equipment information including running hours and start/stop operations to maintenance packages such as Maximo.
- **Benefits:** Determine maintenance schedules on actual usage reducing down time and production issues; Better prediction of the potential for maintenance issues.

### Specialist Connectivity Applications

**Exaquantum/AEE** (Alarm & Events Export)

- **Functionality:** Read value signature data from FMC Technologies systems and store for selection and display within Exaquantum/SSIP.
- **Benefits:** Identify optional process conditions for ensuring quality products. Traceability of process conditions leading to “off-spec” products and auditing.

**Exaquantum/BRU** (Batch Recipe Update)

- **Functionality:** Works in conjunction with Exaquantum/Batch and provides the capability to retrieve all or selected recipe parameters for a specified batch on demand then update the Exaquantum/Batch database with the retrieved recipe values.

**Exaquantum/EES** (Event Event Service)

- **Functionality:** Dispatch alarms upon a tag change, result of a calculation, Alarm and Event messages received, or at the end of an aggregation period.

**Exaquantum/FDM** (File Data Manager)

- **Functionality:** Read Tag, Quality and Timestamp data from a CSV file into Exaquantum. Files are placed in a specific folder and processed upon arrival. Adapters can be provided for specific CSV formats.

**Exaquantum/EFI** (Event File Interface)

- **Functionality:** CSV file interface for importing Honeywell DCS Alarm and Events into Exaquantum.

**Exaquantum/HDE** (Historical Data Export)

- **Functionality:** Export Historical Tag values to a CSV file for a specified period of time.

**Exaquantum/HDM** (Historical Data Manager)

- **Functionality:** Read Tag, Quality and Timestamp data from an OPC HDA Server(s) into Exaquantum.

### Exaquantum/RDS** (Remote Data Synchronization)

- **Industry:** Oil and Gas Production, Oil and Gas Midstream, Power and Energy.
- **Functionality:** Enables the transfer of process and alarm data between Exaquantum servers via satellite, microwave, internet, etc. Secure transfer of process data over unreliable or slow network links. Integration of process information over a wide geographical area. Facilitates the centralisation of key information for easy access to subject matter experts.

### Exaquantum/LDX** (LIMS Data Exchange)

- **Industry:** Oil and Gas Production, Oil and Gas Midstream, Refining and Petrochemicals, Chemicals, Pharmaceuticals and Power and Energy.
- **Functionality:** Integrates production and quality information by collecting laboratory sample data from LIMS packages.
- **Benefits:** Identifies optional process conditions for ensuring quality products. Traceability of process conditions leading to “off-spec” products and auditing.

### The Exaquantum Family

Exaquantum is Yokogawa’s platform application for delivering operational value from the wealth of process information available within process automation solutions. It is seamlessly integrated and aligned with Yokogawa DCSs, Safety Systems, PCI and Analyzers. Complementing and enhancing the value of Exaquantum are three inter-related product suites – Connect, nHance and mPower. These integrate into other Yokogawa higher-level solutions to provide complete manufacturing intelligence.

**ERP**

- **Functionality:** Integrates production and quality information by collecting laboratory sample data from LIMS packages.

**Maintenance**

- **Functionality:** Provides the integration of ERP (Enterprise Resource Planning) systems such as SAP and control systems using the ISA-88 standard. Configurable web services enable the business loop to be closed providing integration of production requests, production status and results, equipment status, KPIs and alerts.

**Laboratory**

- **Functionality:** Integrates production and quality information by collecting laboratory sample data from LIMS packages.

**3rd Party Systems**

Exaquantum collects and stores large volumes of process data such as temperatures, pressures, flows and Alarms and Events providing actionable information that can be viewed and analyzed by key personnel using process graphics, trends, reports, and integrated with desktop applications such as Microsoft Excel.

**nHance**

The nHance application suite provides value-added packaged solutions. Packages such as Exaquantum/OTA (Down-Time Analyses), Exaquantum/SER (Sequence of Events and Trip Recorder), etc. provide solutions to specific requirements and leverage the investment made in existing Exaquantum systems.

**Connect**

The Connect application suite provides the integration of Exaquantum to other systems including ERP (Enterprise Resource Planning) Systems, Maintenance Systems, Laboratory Systems, Asset Management Systems, Control Systems and other Historians.

**mPower**

The mPower suite extends Exaquantum to integrate business and process data within a production model that provides users with validated information required to optimize and maximize valuable production resources. Key functions include Mass Balancing, Data Reconciliation, Energy Balancing, Production Accounting and Movement Monitoring.
VigilantPlant excels at bringing out the best in your plant and your people — keeping them fully aware, well informed, and ready to face the next challenge.

VigilantPlant is Yokogawa’s automation concept for safe, reliable and profitable plant operations. VigilantPlant aims to enable an ongoing state of Operational Excellence where plant personnel are watchful and attentive, well-informed, and ready to take actions that optimize plant and business performance.

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