Experience the change. Experience the continuity.

Since the end of the last century in every corner of industry, a quiet revolution has been under way and gaining momentum. New enabling technologies are starting to uncover the untapped wealth of information in process industries. Visionary companies are moving forward to embrace new automation technologies to unleash the full potential in plant performance. Our message is simple. Don’t wait – we can help you realize this change, without compromising the continuity of your operations.

See

The emerging plant-wide digital networks have the potential to radically change the way you manage your process, your assets and ultimately your business performance. The advent of digital networks such as FOUNDATION™ fieldbus enables intelligent devices to help you perceive a fuller view of your operations. Open connectivity allows you to combine formerly disparate information to gain new insights. Ultimately, by seeing clearly and reducing blind spots in your plant you will be able to synthesize real-time information in a more innovative way.

Clearly

Increased visibility ushers in the possibility of better predictability. The central theme of advanced process control, predictability has been giving birth to optimization technologies such as model predictive controllers. Today, fieldbus-enabled plants are taking a step forward in predictive asset management as well. The next challenge for both the user and the supplier of automation is for the plant to let you know in advance about challenges and solutions to improve the overall plant performance.

Know in Advance

Act

Seeing and knowing alone won’t help unless you can act on the insights you gain. The ability to act with agility is the critical element to having a vital and adaptable plant solution. The old idea of “plant as place” is growing beyond physical boundaries, calling for increased agility in your daily decision making. Non-routine operations grow more frequent as you pursue global production and flexible demand-chain management. Your competitive edge will depend more and more on the human expertise you can mobilize than your sheer physical assets.
To gain the full benefits of the fieldbus revolution, your control systems must be fieldbus ready. Yokogawa’s CENTUM CS 3000 R3 integrated production control system is designed to put you in full control of data-rich digital field information. With Yokogawa’s digital sensors and fieldbus valve positioners on your plant floor, you are at the forefront of the fieldbus revolution. This combined with Yokogawa’s VnetIP open control network assures you the full power of a truly open, deterministic broadband plant network.

The emerging predictive solutions typically require a combination of innovative software and a variety of human knowledge. Through longstanding collaboration with our users and partners, Yokogawa’s solution-based packages are developed based on real-world needs. Coupled with an ever-expanding portfolio of software solutions, CENTUM CS 3000 R3 provides an ideal environment for collaborative production management.

The Terminal Server (TS) function enables remote engineering and operation of your CENTUM system, making it possible for your experts to oversee remote production facilities. The ExperT on advanced operation assistant helps your expert operators to share their intangible know-how, allowing the next generation of operators to inherit their in-depth operation expertise.

*As a result of Yokogawa’s high R&D investment and the consistent long term migration policy of the CENTUM DCS family our investments are secure. The competitiveness of our business is strengthened by installing Yokogawa DCS Systems.*

— Christian Vermum, Manager of electrical engineering department, Degussa Oxeno, Germany
The CENTUM CS 3000 R3 system configuration is designed to handle everything from small-scale facilities to the very largest of plants. Each level, ranging from enterprise to field, can be fully interconnected using the latest technologies. As a result, it is possible to optimize the overall system, reduce site operations, increase automation, raise productivity, and of course, boost profits.

Vnet/IP
A set of network protocols that combines the general-purpose communication capabilities of Ethernet with the highly regarded features of the former Vnet control network, thus retaining outstanding performance in speed and reliability.

**Enterprise Information Systems**

- **Human Interface Station (HIS)**
  - Yonge Gate provides three types of Human Interface Stations (HIS) to match your needs, all of which run under the Microsoft Windows operating system.
  - **Enclosed Display Style Console HIS**
    - The enclosed display style console HIS inherits the design of earlier CENTUM operator consoles, allows side-by-side installation, and features stacked LCDs, touch panel, eight-bop operation keys, auxiliary contact inputs/outputs, and much more.
  - **Open Display Style Console HIS**
    - The open display style console HIS combines a flat-surface desk with an LCD display. As with the enclosed HIS, touch panel, eight-bop operation keys, and auxiliary contact inputs/outputs are also provided.
  - **Desktop HIS**
    - The desktop HIS embodies the HIS functionality in a general-purpose computer, and can be used with a dedicated keyboard.

- **HIS-TSE Server (for remote operation and monitoring)**
  - A terminal service server for remote operation and monitoring.

- **Engineering PC (ENG)**
  - The ENG is a general-purpose PC with engineering functions to perform system configuration or on-line maintenance.

- **Field Control Station (FCS)**
  - The FCS is the hardware which performs dedicated control functions. Physically the hardware can be matched to the requirements of the actual control application in terms of I/O and nodes (small to large) and, thus, offer flexibility and expandability.

- **Remote Node**
  - The remote node is process input/output equipment that is installed in remote locations and communicates with the FCS via a remote I/O bus.

- **Vnet Router**
  - A router that connects a Vnet/IP network and the existing Vnet networks, such as CENTUM CS 3000, CENTUM CS 1000, and CENTUM CS.

- **Generic Subsystem Gateway (GSGW)**
  - A PC that provides OPC H/RT functionality to facilitate communication with OPC server enabled sub-systems.

- **OPC Interface Package (Exapc)**
  - An OPC server package that is used to interface with upper-level (information processing level) computers.

- **Operation Efficiency Improvement Package (Exapilot)**
  - A package that transforms manual tasks performed by the operator into repeatable automatic procedures, thus improving operational efficiency and product quality as well as systematizing the expertise of skilled operators.

- **Plant Information Management System (Exaquantum)**
  - A process information management software package that stores and administers process data and alarm events acquired from the production control system, enabling upper-level applications to easily handle the acquired information.

- **Plant Resource Manager (PRM)**
  - A software package that comprehensively manages and maintains intelligent field devices, thereby improving maintenance efficiency.
Field Control Station (FCS)
Inheriting the rich legacy of the former CENTUM products, Yokogawa’s FCS delivers the highest reliability in the industrial automation market. The FCS’s fault avoidance technologies such as careful component selection, assembling, and cooling, together with its fail-tolerant design including CPU redundancy and hot swapping, guarantees an unrivalled availability of 99.99999 percent, or “seven nines.” This means reliable, long-life plant operation and lower TCO (Total Cost of Ownership).

Yokogawa’s FCS (Field network I/O) is a series of low-cost, reliable I/O modules which have been developed to improve packaging density. The large available range of modules enables you to configure your system to match the requirements for process signals, and to provide for different levels of isolation.

Isolation types: Non-isolation, isolation (all channels are collectively isolated), and isolation (each channel is individually isolated)

Field connection: Pressure, diaphragm, dedicated terminal boards, and MS cables

Environmental resistance: Class 63 corrosion gas and a wide range of operating temperatures

Hazardous area classification: Type N and non-incendive protection provided as standard, I/O modules with a built-in intrinsic safety meter available.

Compact Design
I/O node units can be placed in remote locations and in classified areas where convenient, providing installation savings and reducing size and cost of equipment rooms. Compact components reduce the overall footprint of the control system.

Open Structure and High Reliability
Yokogawa is committed to reducing costs for our customers by enlisting the use of commercial-off-the-shelf technology where appropriate. The new VnetIP is Ethernet based, thin-film cables, repeaters and other network communication devices can be used. Of course, plant reliability is in no way compromised as the communication response is guaranteed (intermittent as opposed to probabilistic) thanks to Yokogawa’s reinforced reliability, dedicated protocol and redundant configuration.

Dual-redundancy and Reliability
The processors, power supplies, and I/O modules including the communication bus support a redundant configuration. When the FCS is configured in a dual-redundant arrangement, the reliability of calculation results is guaranteed through real-time validation. Realtime validation eliminates the possibility of transient errors corrupting the result; and is achieved using an arrangement of CPUs known as ‘Pair & Spare’. In this arrangement, each processor module carries two CPUs. Calculations are displayed in parallel and the results compared. This level of redundancy allows the CENTUM CS 3000 FCS system not only to guarantee impressive levels of availability but also the supreme reliability required in modern plants.

Human Interface Station (HIS)
Choose from three types of HIS hardware to suit the layout of your operation room: a general-purpose PC, enclosed display style console, or open display style console which combines a flat-surface desk and LCD monitors. Whichever you choose, the HIS is based on standard Microsoft Windows that continues to provide the latest technologies.

Windows Operating System
All Human Interface Stations run under Microsoft Windows, so your plant can always benefit from the latest software, networks, and hardware.

Multiple-Display Environment
Two displays can be arranged vertically or horizontally for a single HIS. Use one display for operation, and the other for monitoring alarms, trends and other graphics. Both the console HIS and desktop HIS offer the benefits of multiple displays.

Scalability for Large-scale Plants
The CENTUM CS 3000 R3 is designed to handle even the very largest of plants. Technologies to enable the configuration and control of huge plants are built into the hardware and software, with top quality maintained throughout.

Real-time Control Bus
In large-scale plants, numerous devices are connected to the control bus and the control system must respond and communicate with devices in realtime even when the network is put under extreme load such as an alarm flooding situation created by a major shutdown. VnetIP, the control bus of CENTUM CS 3000 R3, exchanges process data and alarms in a point-to-point fashion in order to maintain reliable and realtime communication in any situation.

Efficient Data Acquisition
Each HIS acquires process data by an event-driven method, in which necessary data is acquired only when the user opens a window. This efficient mechanism reduces the load on each HIS and the network. Furthermore, a data refresh rate of one second is assured, even under heavy load, such as when numerous alarms occur in rapid succession. Therefore, problems can be dealt with promptly and securely whenever they occur.
A unified operation and monitoring environment using various views simplifies decision making for complex operations. Moreover, the windows can be opened by a single click or touch for immediate access to all the necessary information.

**Alarm Window**

Process data and alarm messages can be collected and stored within the control system environment over an extended time. This data can be displayed on a special viewer, which is particularly useful for analyzing plant operations.

**Event Viewer**

Historical messages can be graphically displayed on a daily basis where they can be analyzed more intuitively and quantitatively, through event balance trends, individual event-based graphs, and a list of event occurrence frequencies for each tag.

**Remote Operation and Monitoring**

Plants can be operated and monitored at any time from anywhere. This remote access includes from mobile terminals in the field, from corporate office locations, from home, and from any network connected HMI device. Security and operability appropriate for remote operation and monitoring are fully built-in and easily configurable.

**Security Settings**

In order to protect the plant from operation errors and illegal access and to keep the entire system secure, various security features are designed into the system. These allow for the authorization of operators and the restriction of operation and monitoring functions. These include user security, HIS security, FCS security, tag security, window security, alarm priority, alarm coloring, alarm naming, and fingerprint authentication settings.

**Multiple Monitors**

Two monitors can be configured for a single HIS, so more information can be displayed, and multiple operation and monitoring windows can be displayed simultaneously. The two monitors can be aligned either horizontally or vertically, so you can flexibly arrange the control room according to space and the application, such as using a large monitoring screen.

**Help Window**

Operating procedures (PDF, Word, etc.)

**Fast screen development for creating good operating environments.**

**Regulatory Compliance**

In line with regulations issued by the U.S. Food and Drug Administration (FDA), electronic recording systems are increasingly required to protect data from unauthorized modification or falsification, and to secure data integrity. The CENTUM CS 3000 R3 is compliant with 21 CFR Part 11 regulations entitled “Electronic Records; Electronic Signatures—Scope and Application”, and can manage such critical manufacturing records as process data and operation history with superior reliability. This advantage, coupled with the security settings, enables you to specify a broad range of permissions required to change system data.
Optimizing plant operation by understanding the on-site manufacturing performance in real time has become vital. Yokogawa offers a variety of solution-based software packages which employ the industry standard interfaces, thereby assuring safe, stable, and efficient plant operation.

**Exaquantum**
Exaquantum processes and stores process data, alarms, and events acquired from the production control system. Plant operational performance can be monitored and analyzed using this data. Exaquantum also enables supervisory elements applications to remotely share the data.

**Exaquantum Batch**
Exaquantum Batch is a batch plant information management system that is compatible with the ISA-88 (IEC 61512) batch control standard and 21 CFR Part 11 regulations. The Web-based trend, report, and analysis functions allow Process data to be evaluated in terms of productivity, equipment, and recipes.

**Event Analysis Package - Exapilot**
Exapilot graphically analyzes historical messages in the production control system that contain all the plant operations, in order to locate nuisance alarms and inefficient operation sequences, and thus improve production processes.

**Operation Efficiency Improvement Package - Exapilot**
Exapilot improves the operation efficiency by standardizing and automating the operation procedures based on the expertise of experienced operators.

**Alarm Management System - AAASuite**
AAASuite is a comprehensive alarm management system that optimizes and enhances process alarms issued by process automation systems. AAASuite improves operator performance by providing timely notification of only necessary alarms, by automatically suppressing nuisance alarms, minimizing false actuating alarms, and predicting future alarms, so alarms can be managed effectively as recommended in ESOMAR® Publication No. 191. This prevents alarm flooding and nuisance alarms enabling safe, stable, and cost-effective plant operations.

**Multivariable Model Predictive Control Package - Exasmoc**
Exasmoc uses a model-based multivariable predictive control algorithm that takes various conditions among process variables into account, such as constraints and economic efficiency. In order to perform stable, economically optimal operation.

**Robust Quality Estimator - Exarqe**
Exarqe predicts the qualities of intermediate and final products in real time using associated process measurements such as temperature, pressure, and flow.

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**Sequence of Events Manager**
SEM (Sequence of Events Manager) is beneficial for plants which could sustain large losses or cause a major impact on society in case of a plant trip, such as petrochemical, gas, and power generation plants. SEM captures, records, and displays the event occurrences in chronological order, making it crucial to identify the root cause of the trip.

**OPC Interface Package - Exaopc**
The Exaopc OPC interface package is compliant with the OPC standard and enables upper-level applications to access data from the production control system, incorporating Data Access (DA), Alarm and Event (AE), and Historical Data Access (HDA) services. Exaopc provides high throughputs access to OPC clients. It also includes the fastest batch server interface and can be provided with redundant configuration.

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Efficient System Configuration

Minimum amount of data needs to be entered when configuring the system. Detailed settings for instruments can be easily added at a later time using the option settings window. For more efficient engineering, all configuration windows provide:
- Smart default settings to minimize data entry; only changes need be entered.
- Selection of most entry items from pull-down menus.
- The same look & feel for efficient data engineering.

Concurrent Engineering

Concurrent engineering using multiple PCs on a single system database can be performed. Exclusive access control to the database avoids duplicate modification providing for a collaborative engineering environment.

On-line Maintenance

FCS applications can be changed without having to interrupt the controller. There's no impact on other control functions other than the function being modified. Application changes are notified to all clients in real-time.

Virtual Test Function

A virtual FCS environment is available where both the control functions and operation of an application can be tested. This enables debugging without FCS hardware. Application testing work and engineering time are dramatically reduced, accelerating project progress and reducing engineering cost. For system expansion and modification, applications can be tested and verified without any impact on the actual plant operation.

Engineering Database Management

The engineering database is managed in units called "projects" on a PC. This unified data management enables single data backup for both FCSs and HIDs, so engineering databases can be easily maintained.

Online Documentation

All manuals are provided in electronic format. From the configuration window, the desired manual for the function being used can be pulled up online. More specific information can also be easily located using the smart search function.

Improve Efficiency of Engineering Operation

To improve engineering efficiency, CENTUM CS 3000 R3 supports Integrate iWorks 7.0 (available early 2005), the market-leading instrumentation engineering, design and instrumentation information management software. IO settings, tag names and other engineering data defined using iWorks can be imported to CENTUM CS 3000 R3, and the engineering data specified for CENTUM CS 3000 R3 can be exported to iWorks. The shared engineering data considerably reduces engineering time and work as well as input errors. iWorks is widely used for both the primary stages of engineering and design for production control systems as well as in operating plants worldwide for routine engineering and documentation.

Control Functions

Powerful function blocks for sophisticated controls

By combining the CENTUM CS 3000 R3's powerful functions, such as control blocks, system integration, advanced unit instruments, and batch control, an optimum control system that meets your plant's needs can be easily and efficiently configured.

Function Blocks

The CENTUM CS 3000 R3 provides fundamental blocks for monitoring, control, manipulations, calculations, logic functions, and sequences. These function blocks can be used to implement not only continuous control but also advanced control, complicated sequence control, batch control, and other controls that satisfy diverse user needs. Plant systems can be flexibly designed, ranging from small to large-scale systems, through the combination of these control blocks.

Advanced Unit Instruments

The multiple instruments of a process facility which would previously have been handled individually can now be defined, operated, and monitored as a single unit, simplifying operation. Unit instruments can be applied to batch processes and continuous control processes that require complex management, expanding overall plant operation.

System Integration

To meet the growing need for communication with manufacturing equipment including variable speed drives, PLCs, and “smart” motor protection relays for operation and monitoring, as well as with analyzers, weighing machines, and other instruments used for product inspection, the CENTUM CS 3000 R3 supports a wide variety of communication interfaces such as Modbus RTU, Modbus TCP/IP, and DeviceNet for virtually every PLC and communication.
CENTUM CS 3000 R3's Support of Field Networks

CENTUM CS 3000 R3 was the first control system to receive HIST (Highly Interoperable Support Tool) certification from the Fieldbus Foundation. The combination of PRM and the FOUNDATION Fieldbus offers a huge advantage, enabling your control system to be efficiently maintained. In addition, CENTUM CS 3000 R3 maintains compatibility with a broad range of field networks by supporting other field protocols, such as HART and PROFIBUS.

Yokogawa's Approach to Field Networking

To provide customers with tangible benefits of fieldbus, Yokogawa has pioneered field networking and the standardization of field digital communications. Yokogawa's FOUNDATION Fieldbus-ready products include:
- Differential pressure/measure transmitters (OMEGA EJX series)
- Vortex flowmeters (YEWFLOW Style E and digital YEWFLOW series)
- Magnetic flowmeters (AMAG AE series)
- Temperature transmitters (FTA series)
- Valve positioners (YVP150)
- PH and conductivity meters (SC202, SC204, and H202 series)
- Paperless recorders (DAG2/STATION DX series)

Maintenance Efficiency

PRM (Plant Resource Manager) collects diagnostic information from field devices through the fieldbus, and manages the information in unified databases. With these databases, maintenance schedules can be planned allowing work procedures and spare parts to be managed efficiently. Field devices can be centrally managed thanks to systematic predictive maintenance, reducing TCO and maximizing process uptime.

Predictive Maintenance

Potential field device failures can be reliably detected by combining the devices' self-diagnostics capabilities with PRM's advanced diagnosis functions. This enables efficient scheduling of maintenance work and parts procurement.
Yokogawa provides total support to customers.

Global Service Organization with Full 24-hour Support

Yokogawa has service offices and service representative offices located around the world offering 24/7 support, enabling it to provide unrivalled service on a global basis for its ultra-reliable products. The Response Center, which operates 24 hours a day 365 days a year, provides immediate support for every eventuality.

With its established long-term support system, Yokogawa delivers peace of mind with its products.

Various service programs for peace of mind for your system

- Maintenance Service
  Yokogawa offers a wide range of service programs according to the customer's needs. Extensive support, from corrective maintenance to preventive maintenance, ensures the customer's systems are kept running smoothly for longer.

- Remote Maintenance Service
  Yokogawa’s Response Center links up with your system to provide system condition diagnostics, quick troubleshooting, and problem prevention.

- On-site Services
  Yokogawa customer service engineers (CSE) are on standby 24 hours a day around the globe, ready to fix any trouble.

- Response Center Helpdesk
  The Response Center discusses your requirements, and after installation, provides helpdesk support for your system wherever it may be located.

for peace of mind and a certain future

YOKOGAWA ✦