Batch Process Problems?
Enterprise-Strength Solutions from YOKOGAWA

Enterprise-Strength Batch Control Systems

YOKOGAWA can provide Enterprise Technology Solutions: enterprise-strength total production management solutions, capable of integrating the control and business domains. YOKOGAWA batch systems offer recipe management, scheduling, and production information management functions – based on years of field experience.

ISA S88.01 Control Activity Model

Recipe management
Production planning
Scheduling
Production information management
Process management
Unit supervision
Process control
Exanalp II
CENTUM CS1000/3000
CS Batch 1000
CS Batch 3000

YOKOGAWA Batch Solution

What are the benefits of ISA S88.01?
ISA S88.01 standardizes batch control terminology, for better user-vendor communication, and defines the implementation framework as a hierarchy of interconnected batch control and management function modules. This approach can expedite engineering and cut costs.

Support for ISA S88.01 in YOKOGAWA’s CS Batch 1000 and CS Batch 3000.
The CENTUM CS Batch 1000 and CS Batch 3000 packages for CENTUM CS 1000 and CENTUM CS 3000 support the reusable unit definitions and the complete control-to-enterprise-level hierarchy of activities (process control – unit supervision – process management – recipe management) described in the ISA S88.01 standard. CENTUM CS Batch 1000 supports small to medium-sized systems, and CS Batch 3000 supports large systems. The Exanalp II package adds schedule management functions.
Reliability - 1
Worry-free

Complex batch processes require high-reliability control systems. The CS Batch 1000/3000 packages run on the reliable CENTUM CS 1000/3000 platforms. These platforms have the flexibility to handle everything from small and medium-sized to large plants, and offer redundancy options for high-reliability operation.

Can this package provide integrated management of multiple batch processes, and high reliability even in very large systems?

CENTUM CS 1000/3000 support everything from small and medium-sized plants to large plants. CS 1000 scales to about 8,000 tags, CS 3000 to about 100,000 tags. The CS 1000/3000 batch packages are available in three types (capacities) A, B or C: For CS 1000, these scale to about 4, 10 or 999 active recipes respectively; for CS 3000, they scale to about 10, 50 or 999 active recipes. For large plants with multiple batch processes, you can manage multiple recipe groups / trains.

Solution 1

CS Batch 1000/3000
The functions that require absolute reliability include unit supervision and lower-level logic functions. In the CENTUM CS series, these are executed on reliable Field Control Stations.

Customers demand open systems – but with personal computers, can reliability and safety be assured?

Recipe author and plant operators are different people, so can we assign them different security levels and separate machines?

Recipe Builder is independent of Control System software. The recipe builder runs on Windows NT; you can create recipes and download them from an HIS, networked office PC, or remote laptop. Recipe author and control system operators can have different security profiles.
Batch System Configuration - 1

Yokogawa batch system experience is evident in the CS Batch 1000/3000 packages, which are based on ISA S88.01. These modular, hierarchical packages support reusable components and templates – so they simplify engineering – and you can test configurations using Field Control Station simulation in a PC.

Batch processes are frequently modified; can I reduce the cost of such changes?

Can I reuse a batch process design, copying and modifying the data?

In many systems, the development of unit supervision logic, phase logic and process control functions can be complex and time consuming. In CS Batch 1000/3000 this is simplified by using a unit instrument to represent all the devices and instruments that make up a process unit. A unit instrument may represent a reactor, for example, and (as shown in the figure above) can consist of a modular, hierarchical unit procedure (expressed by an SFC). The hierarchical and modular configuration makes it clear where different functions are located, so it’s quite easy to modify the corresponding phases. Phases and graphics used in an operation can use generic names – such as “VI” for example – rather than actual tag names. Such phases and graphics can be created once and reused in many similar processes – rather than creating new phases and graphics for each. To use such phases and graphics with generic names, simply specify the actual tag name (to be used in place of the generic name) in a conversion list.
Isn’t it very difficult to create complex batch systems from zero?

Can I do the engineering and testing without special hardware?

CS Batch 1000/3000 configuration templates reduce the amount of configuration required. CS Batch 1000/3000 allows users to effectively modify and reuse templates. Representative plant configuration templates — which embody Yokogawa application engineering experience, and greatly reduce the batch system configuration work required — are available.

Virtual test functions support off-line testing — no (control/process) equipment required. You don’t need (control/process) hardware to create and test batch system configuration, including operation and phase logic. You can configure a Windows NT PC to simulate field control stations and run recipe management, unit supervision, and process control tasks — so you can engineer and test batch applications virtually anywhere.

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Batch information

ABC Production Information Report

Product name: Pharmaceutical ABC
Recipe name: ABC No.1
Batch no: ABC1234
Start time: 1 July 08:00
End time: 1 July 15:30

Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
<th>Remainder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingredient A</td>
<td>123kg</td>
<td>1.5TON</td>
</tr>
<tr>
<td>Ingredient B</td>
<td>100kg</td>
<td>2.0TON</td>
</tr>
</tbody>
</table>

Can I use my favorite Windows applications to create batch reports quickly and easily from batch data?

Yokogawa provides an MS Excel-based report package. This makes it easy to import batch data and modify the report format as you wish. The MS Excel-based report package allows you to capture and report data for any stage of the production process. You can easily produce batch reports based on Tag no., or modify existing templates. You can also export data in MS Excel file format.

Since master recipes contain all the product-specific information required to produce a batch, you can simply edit the recipe to change the formulation/product. In multi-product variable-volume production, this allows you to quickly respond to market needs – and to add new products to the product mix.

When adding a new product, new recipe data is needed; Can we easily create new production procedures?

Since the procedure is part of the recipe, sequence changes are not required. Previously, to change procedures required controller program changes. Now you can simply change data (parameters, load amounts, and temperature settings) and unit procedures: no controller program change is required.

Solution

Recipe configuration

| Header: Recipe name, recipe comment, version, management info. |
| Procedure: Procedure for creating product |
| Equipment requirements: Equipment required at recipe run time |
| Formula: Settings required to create product |

Water = 0.5 L
Ingredient A = 80 KG
Agitate for = 1 H

Batch reports

Can I use my favorite Windows applications to create documents and reports with batch data?

CS Batch 1000/3000 allows you to use your favorite Windows applications to create documents and reports with batch data.

Solution

Yokogawa provides an MS Excel-based report package. This makes it easy to import batch data and modify the report format as you wish. The MS Excel-based report package allows you to capture and report data for any stage of the production process. You can easily produce batch reports based on Tag no., or modify existing templates. You can also export data in MS Excel file format.
CS Batch 1000/3000 provides a standardized, open interface, based on ISA S88.01. It seamlessly integrates with the supervisory information system. It can also interface with an existing CS Batch system (see below).

**Solution 10**

**Can batch data be passed to an ERP\(^{(\text{1})}\) / MES\(^{(\text{2})}\) system?**

Open data interfaces make it easy to exchange data with information systems. Support for the OPC\(^{(\text{3})}\) standard makes it easy to exchange data with Factory Automation and Process Automation systems. No special program is required to pass batch data and process data seamlessly to a management information system.

\(^{(\text{1})}\) ERP: Enterprise Resource Planning; \(^{(\text{2})}\) MES: Manufacturing Execution System; \(^{(\text{3})}\) OPC: OLE for Process Control

**Solution 11**

**Can I import data from an existing CS Batch system to MS Excel, and exchange such data with ERP/MES systems?**

Use a Human Interface Station (HIS) to access CS Batch data. You can connect a Windows NT-based HIS directly to an existing UNIX-based CS Batch system, and use the report package to read data into MS Excel. You can also use OPC to transfer data smoothly to an ERP / MES supervisory system.

\(^{(\text{1})}\) Using the “CS Plus” CENTUM CS series NT-UNIX connectivity package

**Solution 12**

**Can scheduling work be further simplified?**

The Exanalp II dedicated scheduler for batch control provides powerful support. Fast automatic scheduling functions and Gantt chart displays – plus a powerful editor – make it easy to create a variety of scheduling proposals, giving you an optimal choice.

**Solution 13**

**Can the Scheduler link Order Information and Production Results?**

You can Update Schedules based on Production Results. Feeding batch progress results data back to the scheduling system makes for flexible production management. This gives you flexibility in responding to urgent batch requests, and rescheduling in real time.
Batch Management Package for CENTUM CS 1000 & CENTUM CS 3000

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