LISTEN.
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SOLVE.℠

PRODUCT PROFILE

FactoryTalk® Batch

OVERVIEW

FactoryTalk Batch enables you to develop batch control systems by supporting flexible production capability, equipment-independent recipes, batch-independent coordination control in an organized control methodology. Using common terminology as defined by the worldwide batch community, FactoryTalk Batch helps standardize company procedures, speed up product and process development, and speed up deployment.

With FactoryTalk Batch, you can:

- Create and manage recipes and execute them automatically.
- Reduce the hours needed for validating and commissioning.
- Configure physical and procedural models.
- Integrate with a wide variety of complementary software applications.
- Collect detailed electronic batch data to generate detailed reports for compliance or process improvement.
- Integrate and exchange batch and recipe information with corporate information systems.
- Simulate your entire batch process.

FactoryTalk Batch supports the design philosophy of modular batch automation, where a batch process is established by defining its physical and procedural aspects and their hierarchies. In addition, FactoryTalk Batch can integrate with a variety of human machine interfaces (HMI), Enterprise Resource Planning (ERP) systems, and Manufacturing Resource Planning (MRP) systems, as well as perform recipe management, process control, scheduling, and reporting applications.

FEATURES

FactoryTalk Batch supports modular batch automation as defined by the Instrumentation, Systems, and Automation Society (ISA) in its S88.01 standard. FactoryTalk Batch:

- Defines your physical model with the graphic interface of the Equipment Editor.
- Defines recipes and your procedural model hierarchically through the Batch Recipe Editor.

- Commands batches and checks your process using the Batch View.
- Gathers and stores production information into your Batch Event Journal.
- Tests your recipes against plant configurations using the Batch Simulator.
- Drops batch controls from the Batch ActiveX® library into any ActiveX or OLE container.
- Customizes security levels to meet industry regulatory standards.
- Reads, imports, and exports XML area model.
- Creates a batch ID programmatically using any algorithm based on the requirements of your process.

FACTORYTALK SERVICES PLATFORM

The FactoryTalk® Services Platform is the foundation of the FactoryTalk Integrated Production and Performance Suite. It is a flexible solution consisting of activation procedures, a common address book, centralized authentication and access control, and uniform diagnostics that can help reduce costs and extend the life cycle of your existing investments.

BENEFITS

FactoryTalk Batch allows your engineers to create processes that help your operators do their jobs more effectively, helping them to make quality products consistently by:

- Sharing resources, maximizing use of expensive equipment or quickly switching equipment in the case of a failure.
- Visualizing and developing complex recipe structures in a graphical sequential function chart format using the recipe editor.
- Reducing the number of recipes required by using class-based recipes.
- Automatically recording all actions that FactoryTalk Batch monitors and controls, allowing full recovery and system redundancy in the event of a control system failure.
- Supporting 21 CFR Part 11 compliance with comprehensive electronic signatures.
- Streamlining electronic signature setup and maintenance through signature templates.

FactoryTalk Batch includes the following applications:

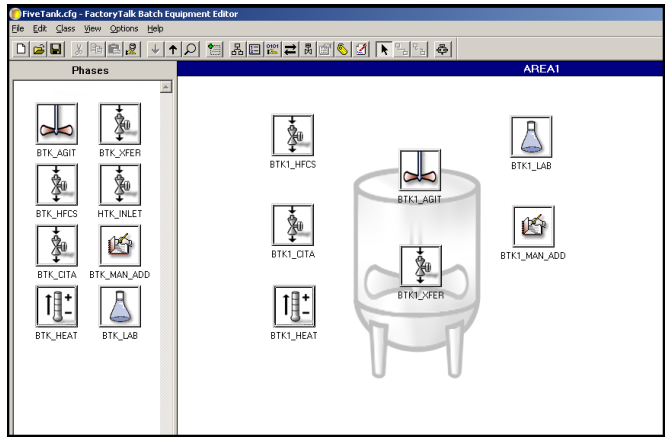
- Batch Equipment Editor — Graphically specifies your physical equipment.
- Batch Recipe Editor — Graphically specifies the procedures necessary to create your master recipes.
- Batch View — Operator interface that communicates with your Batch Server.
- Batch Server — Executes the recipes and coordinates communications between elements that make up your control system.
- Batch Simulator — Simulates and tests your recipes against specific equipment without a connection to the physical process.
- Batch Archiver — Transfers your real-time electronic batch data to any ODBC-compatible database.

FACTORYTALK BATCH EQUIPMENT EDITOR

CONFIGURE THE PHYSICAL MODEL

Part of the ISA S88.01 standard includes the physical model, which is the hierarchy that describes the physical equipment of your batching operations. In FactoryTalk Batch, the physical model is set up through the Batch Equipment Editor in a logical progression, starting with the area and building to the equipment module level. Using the graphical interface in the Batch Equipment Editor, you use templates to create and maintain information about your process equipment. Once you've defined the physical model, information in that physical model is available to all other FactoryTalk Batch components.

Each level of the hierarchy is comprised of at least one of the components of the level just below it. The hierarchy levels, from top to bottom, are the area, process cell, unit, equipment module, and resource.



Area
The area is a physical, geographical, or logical grouping made up of one or more process cells.

Process Cell
A process cell is all of the equipment used in the production of a batch, such as all of the equipment in a polymer line. A process cell is made up of one or more units. The units can be shared by process cells.

Unit
A unit performs a major processing activity on a batch and is usually centered on a major piece of equipment, such as a reactor, mixing tank, or in-line mixer.

To simplify the set up of equipment that has essentially the same capabilities, FactoryTalk Batch allows you set up classes for process cells and units. For example, a process cell may contain several reactors that can agitate and heat their contents. Designating one class for these reactors, you can set up procedures to work with any of the reactors in that class, rather than with a single piece of equipment.

Equipment Module
An equipment module is a functional group of equipment that allows you to carry out a finite number of specific minor processing activities, such as mix or weigh. In FactoryTalk Batch, you can designate an equipment module to be shared by two or more units.

Resources
Resources are anything that is required to make a batch. Resources are often control modules, which S88.01 defines as single entities from a control standpoint. Examples of control modules are:

- Regulating devices
- State-oriented devices
- Combinations of devices that function as a single device, such as a valve or pump
- Controller instructions that operate as PID controllers
- Operators

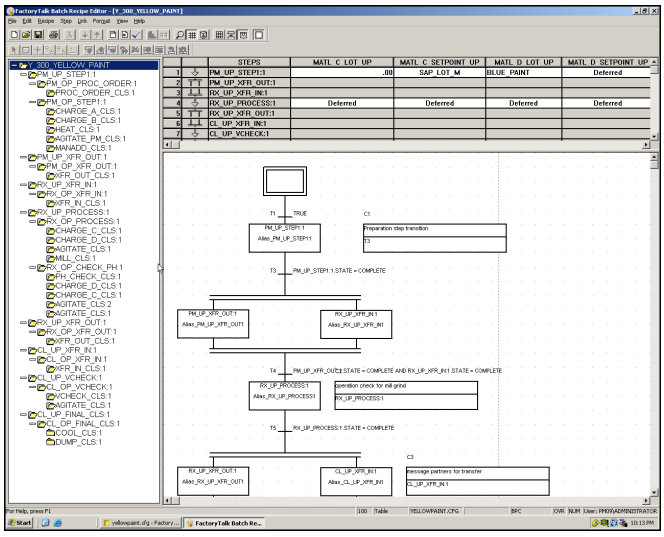
You can set up resources in FactoryTalk Batch to be dedicated or shared. Dedicated resources can be used by only one other piece of equipment and only one other area model element. Shared resources can be used by more than one piece of equipment, allowing you to maximize use of expensive equipment or quickly switch in case of equipment failure. FactoryTalk Batch can be set up to allocate and arbitrate usage of shared resources automatically.

FACTORYTALK BATCH RECIPE EDITOR

DEFINE RECIPES AND THE PROCEDURAL MODEL

ISA S88.01 includes a procedural model that corresponds to the physical model. In FactoryTalk Batch, procedures are added in the Batch Recipe Editor, which is used to help you build recipes that define the sequences of equipment actions in a batch process. The Batch Recipe Editor provides a simple way to configure, organize, and store recipe information. As in the Batch Equipment Editor, recipes are built hierarchically and consist of procedures, unit procedures, operations, and phases. Recipes also include descriptive information, formula information, equipment requirements, and the procedures used to make the batch. Additionally, you have the capability to add comments into the recipe structure that can be viewed both in design and runtime.

Settings you make in the Batch Recipe Editor interact with equipment configurations that you made in the Batch Equipment Editor. For example, an equipment module controls the temperature in a reactor, but the recipe determines the proper temperature setpoint. This relationship allows you to use recipes to produce several products with the same equipment logic, without having to hard code parameter values for each product.



Procedure
A procedure is the general overall strategy for batch production in a process cell and is made up of unit procedures. After a procedure is built in the Batch Recipe Editor, you can verify it against the physical model in the Batch Equipment Editor, ensuring that the process is physically capable of executing the procedure.

Unit Procedure
A unit procedure is a production sequence carried out in a single unit. It is made up of operations.

Operation
An operation is an ordered set of phases that are carried to completion within a single unit. Operations usually involve taking the material being processed through some type of physical, chemical, or biological change.

Phases
A phase is the lowest level of a procedure that can accomplish a single action, such as heat or dump. In S88.01, the recipe phase is the lowest level of the procedural model.

FactoryTalk Batch allows for Visual Basic or Visual C++® PC-based phases that communicate with the Batch Server without the use of a process-connected device. PC-based phases can be used for a variety of tasks, such as operator prompts, timers, and calculations. By using PC-based phases instead of phase logic, you can decrease the memory required within your process-connected devices.

Use Tables or Sequential Function Charts to Create Your Recipes
The Batch Recipe Editor allows you to build recipes using a table or a sequential function chart (SFC). For simple recipes, table-based recipes allow you to view and edit all recipe parameters without having to navigate between steps. For recipes with a complex recipe structure or complex transition expressions, the SFC tool allows you to construct recipes graphically. With the SFC tool, you can display and hide steps to make it easier to visualize the recipe structure. For example, you can open each unit procedure to see the operations it contains. SFCs support looping and parallelism at every level, allowing for extensive reusability of operation libraries.

Null steps can be added to any level of your master recipe. Null steps provide extra transition to conditions and create more flexible SFC structures. The Batch Server supports null unit procedures, null operations, and null phases without requiring the configuration of a null unit or equipment phase.

Dynamically Allocate Physical Equipment through Class-based Recipes
If you set up unit classes in the Batch Equipment Editor, you can build recipes against the unit classes instead of against specific units. Using class-based recipes reduces the number of recipes that need to be created and maintained.

By using class-based recipes, you can also defer assignment of a unit until a batch is created or a recipe step becomes active. FactoryTalk Batch can prompt the operator when the assignment decision is required, or it can automatically make the decision based upon a first-available algorithm. This flexible binding capability allows your operations personnel to respond to changing equipment statuses. If a unit fails during the execution of a batch, FactoryTalk Batch can even re-bind its recipe to a new unit to finish the batch.

Store and Edit Recipes Outside of the Batch Recipe Editor
You can store and edit recipes in a relational database management system (RDBMS) format. This allows external applications to update and report on recipe data through standard interfaces and languages such as Structured Query Language (SQL) and to integrate recipe definition with business systems.

FACTORYTALK BATCH VIEW

COMMAND BATCHES AND CHECK YOUR PROCESS

The standard human interface to your system is the Batch View. Through the Batch View options, you initiate recipes, control batches, access Batch Server functions, and access all FactoryTalk Batch information.

You can command and monitor batches from the Batch List window, a table view, or from the SFCs of the selected batch. When you use the SFC view, you can watch a batch execute and change, repeat, or skip steps in the recipe. You can even change recipe formulation values during execution. To create and run phases without running recipes, a view is available in which phases are displayed relative to their units. Batches can also be run by creating control recipes from master recipes in a view.

Your operators can check for and respond to batches from one location that displays all batches that require prompt acknowledgements or signoffs to continue execution. An operator with the appropriate security permissions can sign off, completing the electronic signatures.

With Batch View, resources are arbitrated by viewing current resource allocation information, acquiring available resources, and releasing operator-owned resources. You can also check and troubleshoot phases by displaying all phase failures for the current batches. The Batch View lets you check the electronic journal for a batch, including information about each event that occurred during the execution of a batch or the running of a phase.

Batch View components can be added to other HMIs as needed for your system. For example, you can use a configurable hot link to FactoryTalk View to develop a custom interface for commanding and viewing your process. Many of the Batch View components are also provided as ActiveX controls, so you can place them in container applications, such as Web browsers or Visual Basic programs.

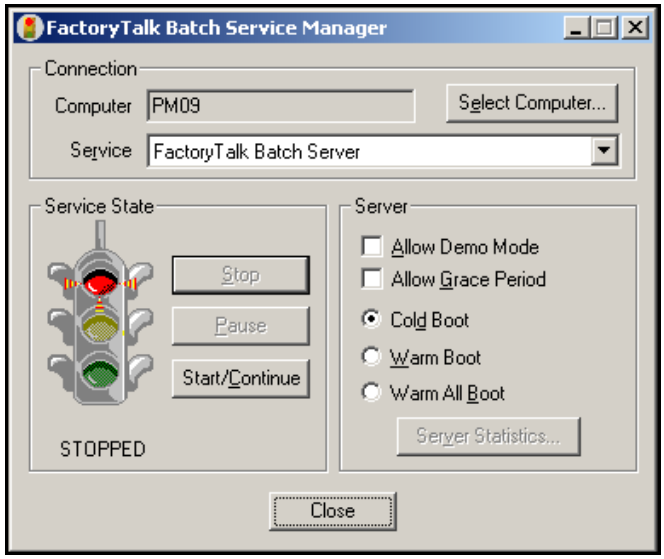
FACTORYTALK BATCH SERVER

BEHIND THE SCENES

The Batch Server is the engine that runs FactoryTalk Batch. It allocates resources, supports system failure recovery, and provides communication functions. It also gathers and stores production information into the Batch Event Journal for reporting and archiving.

The Batch Server transforms your configured recipes into executable recipes and allocates resources based on recipe and operator requirements. Batch Server manages recipes that require concurrent use of the same equipment phase in two different parts of a recipe, preventing deadlock conditions and other problems. The arbitration mechanism also allows your operator to acquire ownership of an available resource, preventing its allocation to a batch. If parallel steps require the same dedicated resource, the Batch Server automatically determines how the resources are allocated among steps when the batch is run.

The Batch Server also supports redundant storage. During runtime, the Batch Server is continuously journaling all actions to one or multiple disk drives so that you can fully recover data in the event of control system failure for system redundancy. In the event of a failure, you can re-start the Batch Server on another machine and it will return to the previous locations in all active recipes.



As an OPC2 client and server, Batch Server reduces your risk of communication errors, providing robust communications.

The Batch Server transfers your data between the process-connected devices (PCDs), operator displays, human machine interfaces (HMIs), databases, and various other software packages. Batch Server also integrates with data servers, the Rockwell Software® *e*Procedure® server, and the FactoryTalk® Batch MaterialTrack functionality server.

Through its Phase Logic Interface (PLI), FactoryTalk Batch achieves seamless integration with the Rockwell Automation® Integrated Architecture™ or multiple types of process-connected devices in a single Batch Server. Phase logic consists of the control steps and algorithms that start and control the process functions of your plant. FactoryTalk Batch sends commands through the PLI to PCDs. The PLI allows FactoryTalk Batch to coordinate phases and arbitrate equipment that resides in multiple devices even if the devices cannot directly communicate with one another.

PREFERRED INTEGRATION WITH RSLOGIX 5000 PHASEMANAGER

The most comprehensive activity in deploying an S88-compliant batch system is designing and building the phase level control code. FactoryTalk Batch now integrates with PhaseManager, which embeds an S88-compliant phase state model directly in a Logix-based controller. PhaseManager provides a structure to streamline the creation and implementation of phase logic. Phase Logic Interface is now embedded in the controller.

Once your Area Model is set up to the phase level in the Batch Equipment Editor, you can use the equipment editor PhaseManager synchronization option to push the phase information and structure down to the Logix-based controller. Tags are automatically built and referenced to the Batch Equipment Editor. You may also take existing phase logic that was developed in the controller and synchronize it with the Batch

Area Model. Once phases are built in Logix, you can run each phase individually to test it for commissioning or simulation within the Logix 5000 editor.

Phases can be executed in recipes from FactoryTalk Batch, or from a sequential function chart (SFC) routine in the Logix controller. PhaseManager also uses CIP messaging with the FactoryTalk Batch server for robust communications; a 10*x* or more increase in data communications rates over OPC communication have been achieved.

INTEGRATING WITH MATERIALTRACK TO MANAGE MATERIALS AND RECIPES

MaterialTrack™ provides real-time material management and traceability in batch execution systems, enhancing corporate inventory solutions and allowing more effective management of materials and recipes.

When integrated with company-wide inventory management systems, MaterialTrack complements ERP-level resource management by collecting the detailed material and equipment-tracking information needed for optimizing your supply chain and e-business fulfillment.

MaterialTrack also manages and tracks the use of materials, vessels, containers and pallets, and permanent and transient storage.

With MaterialTrack, you define recipes by either equipment or material. For equipment-based recipes, MaterialTrack allows you to add material definitions to the recipes. This significantly reduces the number of recipes that need to be maintained and commissioned because you do not need to have an individual recipe for each container route. You can now use one recipe for each product.

For your material-based recipes, MaterialTrack combines the recipe with information about the location of materials to automatically determine which equipment must be used to meet the request. This allows less operator interaction and uninterrupted recipe execution. For example, if you make an equipment-based recipe that gets sugar from storage Tank_A and Tank_A is empty, the recipe cannot continue. However, a material-based recipe automatically draws the sugar from any appropriate container.

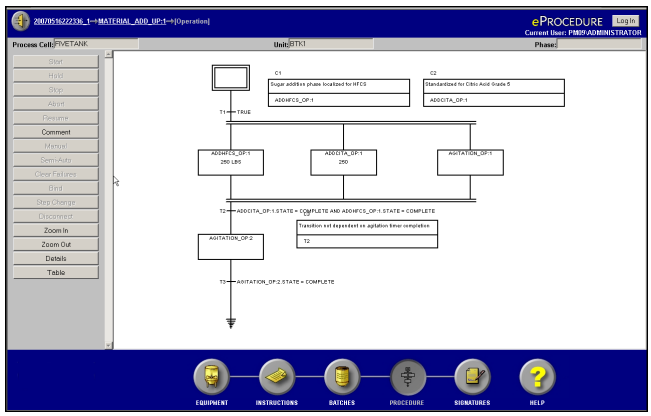
INTEGRATION OF MANUAL OPERATIONS WITH *e*PROCEDURE

The capability to integrate manual steps into your automated Batching system is included in FactoryTalk Batch.

*e*Procedure automates manual procedures using an interactive, Web-based interface to sequence and document manufacturing operations. It provides the consistency of automated controls for manual operations, and executes recipe instruction, controls resources, displays instructions to operators, and logs all responses.

Approved procedures can be reused. To show operators the information they need for correct production, you can use hypertext links to other production documents such as operating procedures, material safety data sheets, and equipment maintenance manuals. You can also use links to multimedia assistants, product and process photographs, and even video. Based on proven Web technology, *e*Procedure uses standard PCs and LANs, and Microsoft Internet Explorer browsers. It does not require client-side installation.

*e*Procedure also aids applications that are regulated by government or industry standards by improving repeatability by directing manual operations along approved procedures and establishing a consistent record-keeping methodology. Every operation executed has a unique log that can be transferred to any ODBC database, providing a central location for all data. This critical information can quickly be received in a structured format, saving hours of collecting data from paper records.



FACTORYTALK BATCH SIMULATOR

TEST YOUR RECIPES

You can test recipes against plant configurations without running them in the plant using the Batch Simulator. You can configure Batch Simulator to match a specific project and PCD. During simulation runtime, you can modify phases, change phase states, and cut-over one phase at a time, speeding the debugging process.

FACTORYTALK BATCH ARCHIVER

SEND DATA TO A DATABASE

The Batch Archiver option collects data from your electronic event journals and stores it in an ODBC-compliant relational database, such as SQL Server or Oracle. Each batch is recorded in a separate file that contains a complete record of all activity for both manual and automated workflow, including timestamps, batch IDs, user names, computer names, and process cells. Event journals are ASCII files that can be viewed with a word processor or spreadsheet.

ADDITIONAL BENEFITS

INTEGRATE WITH YOUR OTHER SYSTEMS USING THE ACTIVEX LIBRARY

The Batch ActiveX Controls Library provides pre-coded controls that you can drop into any ActiveX or OLE container. The ActiveX controls allow you to incorporate Batch View functionality into FactoryTalk View to incorporate intranets or company-specific manufacturing execution software.

The ActiveX controls communicate with the Batch Server and allow you to monitor and control a recipe without running Batch View. ActiveX components integrate with security, so you can build View-only nodes.

SECURITY AND AUDITING

The security capabilities within FactoryTalk Batch were designed with input from major pharmaceutical clients and now tightly integrate with FactoryTalk Security and aspects of the FactoryTalk Services Platform. The security levels can be customized to meet the most demanding requirements, such as the U.S. Food and Drug Administration (FDA) Good Manufacturing Practice (GMP) regulations.

FactoryTalk Batch includes configurable electronic signature templates that represent a signature and its associated data, such as signoff level, comments, security requirements, and date and time stamps. Up to three signatures can be required for verification of runtime Batch events, such as changes to recipe values from the Batch View or ActiveX controls. All signatures are stored in the event journal and are non-editable, fully supporting 21 CFR Part 11 compliance.

Signature templates streamline the process of setting up and maintaining your electronic signatures. Each signature template defines rules that are specific to a group of users. Rules include options such as who can complete a particular type of signoff and how many signoffs are required. Once templates are set up, you choose the users, or groups of users, to be assigned to each template from a pick list. Each user assigned to a particular template will then have a consistent set of security permissions.

Auditing provides you with a detailed audit trail of user changes to the area model and recipe data made from the Batch Equipment and Recipe Editors. These audit messages are forwarded to FactoryTalk® Diagnostics and FactoryTalk Audit, aspects of the FactoryTalk Services Platform. FactoryTalk AssetCentre diagnostic destination is also supported.

XML SUPPORT

The Batch Equipment Editor can read, import, and export XML area model files, following the S88/S95 schemes. This makes it possible for the Batch Equipment Editor to be integrated into third-party editors or editing procedures. The area model schema includes signature templates and verification policies.

The Batch Recipe Editor can read and write XML master recipes, and the Batch Server can read XML master recipes.

COMPATIBLE WITH A WIDE VARIETY OF HARDWARE AND SOFTWARE

The Rockwell Automation Integrated Architecture provides a seamless interface from FactoryTalk Batch to scheduling, ERP/MRP Systems, and Human-Machine Interface (HMI) software using the same networking and I/O systems across the discrete and process areas of an application. The relationship between FactoryTalk Batch and your other software packages is complementary and cooperative.

All information within FactoryTalk Batch is accessible through the Microsoft® Component Object Model (COM) and Distributed Component Object Model (DCOM) interfaces. These protocols help you integrate with a wide variety of software applications. For example, you can enter laboratory data into FactoryTalk Batch, either directly or through any software packages commonly used in the lab.

GET MORE INFORMATION

For ordering information, contact your local Rockwell Automation sales office or Allen-Bradley distributor. Or learn more by visiting http://www.rockwellsoftware.com.

FactoryTalk Services Platform

The FactoryTalk® Services Platform delivers value. It is a shared set of common features that enables superior interoperability and commonality between applications for reduced engineering, operations and training costs, while extending the life of existing investments. The FactoryTalk Services Platform provides a solid foundation for today and a path for the future.

	Activation	Directory	Security	Diagnostics	Audit	Live Data	Alarms & Events
FactoryTalk Batch	✓	✓	✓	✓	✓	✓	

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Publication FTALK-PP002A-EN-P – June 2007