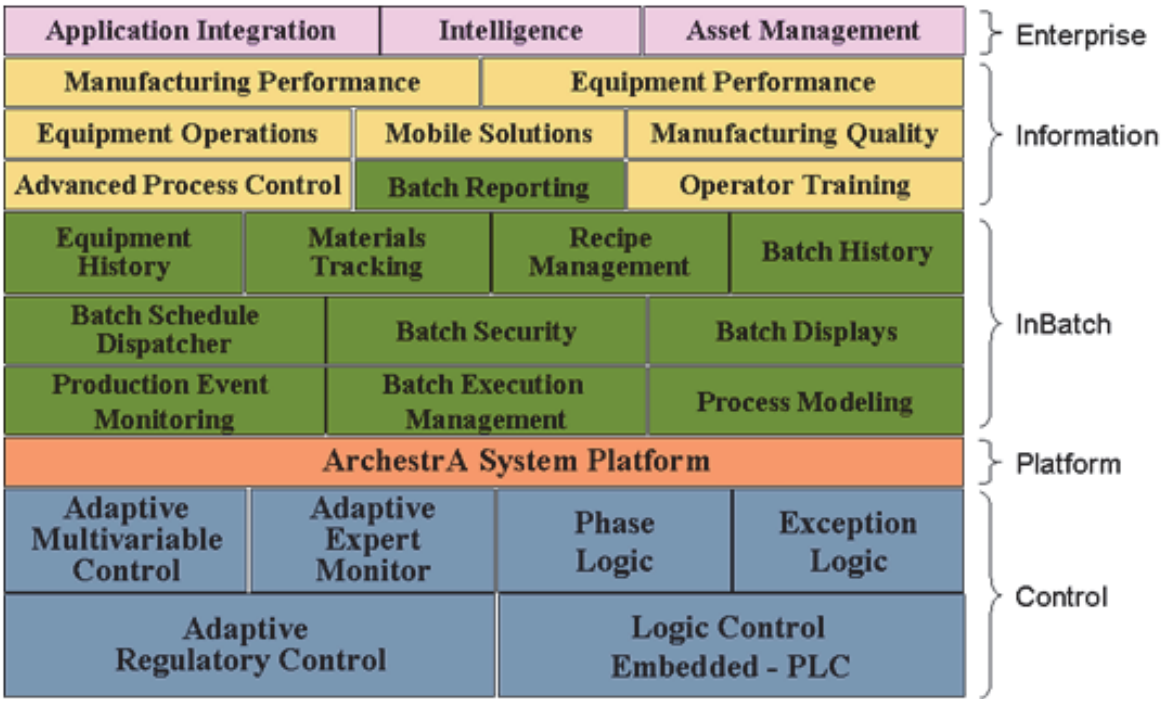
Foxboro Evo™ Process Automation System

Product Specifications

Foxboro® by Schneider Electric

PSS 21S-4INBATCH

InBatch™ 2014 R3 (v11.5)



InBatch™ software enables comprehensive batch control solutions to process industries, such as food, beverage, life sciences, and fine chemicals.

OVERVIEW

InBatch software is an easy-to-use graphical control package that requires no programming. A model of the process is created interactively on workstation display screens with icons and selections from pull-down menus. Recipes are configured by specifying unit and phase data interactively. The recipes are represented graphically in IEC 61131-3 based sequential function charts.

InBatch software provides recipe management, production information management functions, and an appropriate environment for hierarchical structuring of batch process control.

InBatch software has a hierarchical management and control structure that allows plant engineers to maintain the system easily. By splitting the logic into real-time process control (the phases running in sequence blocks) and supervisory (Batch) control, a top-down/bottom-up approach allows a structured and efficient implementation of batch projects. All configuration data, recipes, and batch records are kept in relational databases.

Integration of the Batch system with enterprise and Manufacturing Execution Systems (MES) modules enables a more complete batch management solution including equipment and production performance and optimization.

FEATURES

InBatch software is a flexible batch management system that automates batch processes and provides a complete production history. Consistent with the Instrumentation, Systems, and Automation Society of America ANSI/ISA 88.01 - 1995 standard, InBatch software allows you to quickly and easily create recipes and simulate their execution against a model of the process - all before writing one line of control code. InBatch software also provides a complete material genealogy.

InBatch software features include:

- Field-proven batch engine
- Redundant Batch Server option
- Material genealogy
- Integrated Batch human interface (Batch View) when installed to work with Foxboro Evo™ software
- Integration with FoxView™ software, FoxAlert™ software, Sequential Function Chart and Structured Text (SFC/ST) Display Manager, and AIM*AT® software when installed to work with Foxboro Evo software
- Integration with ArchestrA® System Platform, Galaxy Repository, Wonderware® InTouch® software and Wonderware Historian software when installed to work with the Foxboro Evo Control Software
- Batch History data stored in Microsoft SQL Server
- Web-based reporting leveraging Microsoft® Reporting Services
- FoxBatch™, RBATCH, I/A Series Batch, and InBatch Application Migration
- With the purchase of Wonderware Enterprise Integrator and additional services, comprehensive Enterprise Application Integration (EAI) solutions can be implemented for InBatch software using World Batch Forum Business to Manufacturing (B2MML) schema, based on the ISA-95 standard.
- Aid to customer compliance with FDA 21 CFR Part 11 on Electronic Records and Electronic Signatures.

InBatch software offers these significant benefits:

- Reduces the life-cycle engineering effort and facilitates recipe development and updating
- Reduces dependence on system experts (recipe configuration can be done by process engineers or chemists)
- Speeds batch processing for greater production capability
- Produces more consistent batches that meet tighter tolerances
- Provides flexibility for manufacturing different products, grades of products, and quick switchover between products
- Offers extensive data collection and batch production reports that help in production tuning and in meeting FDA requirements
- Provides expandability from entry level system to large installations while maintaining full functionality.

INSTALLATION OPTIONS

InBatch 2014 R3 (v11.5) software can be installed and configured with or without I/A Components that enable tighter integration to the Foxboro Evo distributed control system. The I/A Components include the Foxboro Evo driver communication software via AIMAPI, Foxboro Evo Tag Linker, as well as the Foxboro Evo extensions to the runtime batch scheduling and display interfaces and batch reporting.

Installing and configuring InBatch software without the I/A Components enables a tighter integration to the Wonderware System Platform, security, Galaxy Repository, and use of the Foxboro Evo Device Integration Object (IADI) and/or the Foxboro Evo Data Access Server (IADAS) for communication to the Foxboro Evo DCS as typically delivered in a Foxboro Evo Control Software solution.

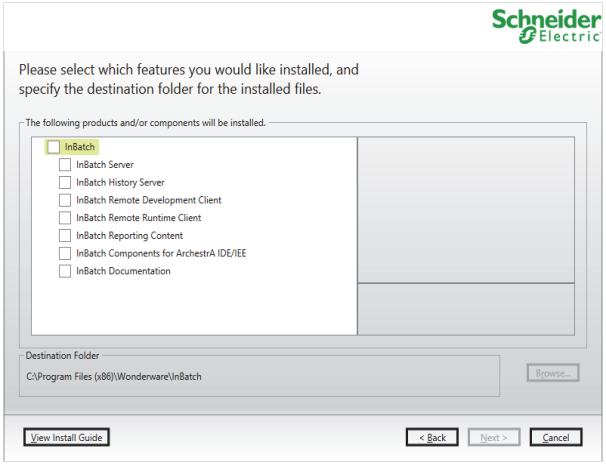


Figure 1. InBatch Installation Dialog Box

PROCESS MODELING

A batch processing plant is made up of units, process classes, connections, transfer classes, process phases, and transfer phases.

- A unit is a group of equipment that processes materials such as reactors, mixers, blenders, trains and retorts. A unit can also simply hold materials. Examples of units are reactors, holding tanks, bulk storage vessels, filling stations, and manual addition stations.
- Process classes are groups of units. Each unit in the class has the same processing capabilities and/or performs the same function.
- Connections define a group of equipment that transfers material from a source unit to a destination unit.
- Transfer classes define a group of connections where all source units are in the same process class and all destination units are in the same process class.
- Process phases with their parameters define the capability of process classes.
- Transfer phases with their parameters define the capabilities of transfer classes.

InBatch software supports three approaches to structuring the batch process plant into the process model:

- Comprehensive model
- Connectionless model
- Hybrid model.

The comprehensive model uses all the available configuration tools of the InBatch software including process classes as well as transfer classes, while the connectionless model deals only with the definition of process classes. In this case, the movement of material between units is accomplished using complementary transfer phases that are assigned to a process class rather than to a transfer class. The hybrid model uses a combination of the comprehensive and connectionless models, maximizing the benefits of both approaches. To decide which approach is optimal for your specific application, analyze the batch philosophy of your company, the process being modeled, the flexibility

requirements, the user interface requirements, and the historical batch recording requirements.

An integral part of process modeling involves defining specific data points, called tags, for units, processes, connections, and transfers. Tags allow the mapping of data between InBatch software and the controllers.

The process model also specifies the relationship between the tags used in workstations and controllers. Initially, InBatch software generates default relationships which can be modified during the modeling process.

The process model allows each process variable to have a unit of measure assignment. This unit of measure attribute is assigned to the formula parameter, such as Degrees Fahrenheit for the formula parameter named Temperature. The Process Model Editor also provides an enumeration data class option. This option allows the assignment of a Set Name to a list of integer values, each one having a corresponding alphanumeric string value. An example might be Automatic -2, Semi-Auto -1, and Manual -0.

Run-Time Model Edits

The physical model of the plant can be edited while the system is running. Edits are actually made to a different database than that used by the run-time system. To effect the model changes, the InBatch run-time applications must be stopped, an “update run-time” action must be taken, and then the InBatch run-time applications can be started. These actions are performed from the Environment display.

Automatic Tag Creation

The capability to automatically add, change, delete, and assign all phase parameter, control and status tags is provided, significantly reducing the time it takes to build a physical model of a plant.

Model Import//Export

The InBatch Import Export Utility can be used to export a portion of a model from one model database and then import it into a new model database. This utility is useful when you have a corporate master database and want to use it to create new plant level model databases, which are a subset of the master.

The InBatch Import Export Utility can also be used to copy phases from one process/transfer class to other process/transfer classes, either in the same model or a different model.

MATERIALS TRACKING

Materials tracking defines materials as ingredients, intermediates, finished goods, by-products and others, and includes the characteristics of each material. The batch materials database is used to automatically track the location of materials stored in different units.

The batch management function uses the ingredients' location data to get ingredients during the manufacture of a batch. This capability allows ingredient locations to be independent of recipes and control programs and permits ingredients to change location with no effect on recipe execution provided that a comprehensive process model is used.

The unit location can be entered in the materials database by plant personnel when new ingredients are received. A lot identification can also be assigned to a material, and multiple lots of the same ingredient can be stored in the same vessel.

The batch management system updates the database when ingredients are used and when intermediates and finished goods are produced. The materials database provides easy access to work-in-process (WIP) information and can be used to update higher level management and Material Resource Planning (MRP) systems with ingredient usage, work-in-process, and finished goods production information. Materials tracking can be used to complement an existing inventory system.

PROCESS MANAGEMENT

Batch Scheduling

A batch is scheduled by entering the campaign, lot, batch, and recipe name. A formula can also be assigned to a scheduled batch. The formula can be modified outside of InBatch, and then used to change the formula values for the active batch. This allows the use of the same generic recipe procedure with different formula values and/or materials during run time. The train also needs to be selected with the batch size and the mode. The mode can be automatic, semi-automatic, or manual.

AUTO: In automatic mode, the default mode, the unit procedures, operations and phases are activated automatically as specified in the recipe.
If the option is enabled, the operator can abort any phase and the batch auto-switches to the semi-automatic mode.

SEMI-AUTO: In semi-automatic mode, the operator must start each phase manually. The order of phases is specified in the recipe.

MANUAL: In manual mode, the operator can select any available phase in the recipe to be performed next. For example, manual mode allows an operator to retry a failed phase or to choose DISCHARGE and dump a batch immediately.

The batch scheduling function maintains a list of batches to be produced and allows priority based execution of batches, where the priorities can be manually specified or modified.

Batch Validation

A batch must be validated before it can execute. Validation of a batch consists of:

- Verification of recipe existence in the database
- Verification of process model references made from the recipe
- Verification of materials database references made from the recipe
- Verification of train existence
- Verification of the batch size against the allowed boundaries.

Batch Management

The Batch Manager directs and supervises the execution of the batches. Based on the recipe procedure, phases are executed in sequential and

parallel fashions after checking that the appropriate transition conditions are satisfied.

The Batch Manager also interfaces with batch display modules and provides operators with information on the batches running in the system. The Batch Manager coordinates the usage of process units for each batch and allocates units as they are available, within the specified train. Unit selection can also be done manually. The Batch Manager captures all batch execution events and operator activities during the execution of a batch and sends this information to the Batch History database.

Restart Capability

Batch Manager has the capability to restore the previously known-good state of the system upon restart after unexpected system shutdowns. As the batch management system executes batches, all batch execution and equipment allocation information is written to multiple data files. If a system failure occurs, these files are read by the batch management system when restarted. The data in these files allows the batch management system to resume batch operation.

To maintain the exact state of the batch in these data files when power fails, an uninterruptable power supply (UPS) is required on the Batch server. The UPS allows for an orderly shutdown of the Batch server to preserve batch state data.

Simulating Batches

InBatch software allows batches to be run in a simulation mode, where batches are created and run without actually starting the phases in a control processor. You specify a global phase duration time to permit operator interaction during the simulated execution.

Recipe Procedure Jumps

The Batch View allows you, as the operator, to jump forward or backward in the recipe procedure and edit phase parameters (formula). To enter the jump mode, the batch must be in the Held state.

After exiting the jump mode, you can restart the batch at the selected procedure. All events are logged by the Batch Historian.

Save Control Recipe as Master Recipe

At batch completion, as an operator, you may save 1) all phase parameter edits, and/or 2) the equipment used (creating an equipment-dependent recipe), as a master recipe. You have the option to overwrite the existing master recipe increasing the version level, or to save it as a new master recipe. You are required to enter a user name and, if desired, may enter a comment. You must have an appropriate security role for a save to occur.

Viewing Transition Logic Status

Transition logic expressions, their description and status can be viewed at run time. Additionally, the ability to force a transition to a true state is provided.

View and Edit Phase Parameter Values

Phase configuration and phase parameters can be edited for any batch that has a Ready, Run, Done, Held or Aborted status. All edits are saved to history. This includes changed formula parameters, phase instructions and enabling or disabling comment required or operator acknowledgment (Ack on Entry or Exit).

Operator Entered Comments

A comment may be entered and saved to history for any batch that has a Ready, Run, Done, Held or Aborted status.

Display Equipment Name on Procedural Element

The actual unit or connection name that is allocated

is displayed on the unit operation procedural element.

Print Schedule

Use this feature to print the list of scheduled batches.

View Schedule

In order to manage large numbers of scheduled batches, you may specify view and filter criteria by which the Batch Scheduler application alters the list of scheduled batches.

The function supports user selection of trains, recipes, recipe types, recipe states, or specific campaign, lot, and/or batch information (refer to Figure 2). The scheduler then presents a list of batches that match the criteria.

View and Edit Equipment Allocation Queue

From the Batch Scheduler and Batch Display, you can review equipment allocation, release equipment, and switch allocation to a different piece of equipment.

If you need to ensure that the equipment will be ready before batch processing begins, you can manually allocate equipment for a batch.

Automatic Creation of Batch ID using User Prefix

The capability to append a numerical character to a user-defined Batch ID prefix has been provided.

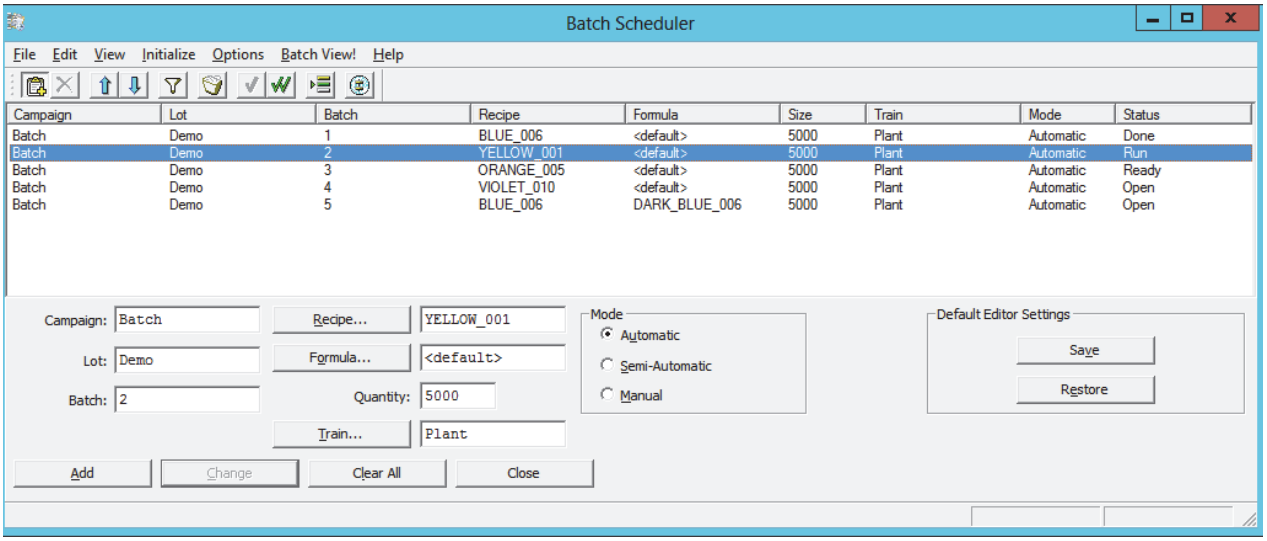


Figure 2. Batch Schedule Display (InBatch with I/A Components Version)

RECIPE MANAGEMENT

The recipe management function provides the environment to configure, copy, and modify master recipes in an IEC 61131-3 graphical environment. The recipe structures follow the ANSI/ISA 88.01 - 1995 standard and support all three levels of the standard: unit procedure, operation, and phase. Refer to Figure 4.

An option allows the recipe to collapse to two levels: unit procedures and phases. To migrate three-level

recipes to two levels, operations are eliminated.

InBatch software provides the environment for maintaining version history of a master recipe with date and time stamp, author name, and optional comments. Up to five levels of recipe approvals can be implemented.

A master recipe is scalable to the batch size specified manually or by production schedule. All formula quantities for ingredients, intermediates, by-products, and finished goods are scalable and can be entered either as actual quantities or as a percent of the total batch size.

Recipe and Formula Import and Export

The Recipe Editor features a BatchML standards-based XML file import and export that allows you to move or share recipe and formula information between multiple InBatch or third party systems. The Batch Markup Language (BatchML) is courtesy of the World Batch Forum, and consists of a set of XML schemata. In addition to XML, recipe formulas can be imported and exported in CSV format. This allows a formula to be modified outside of InBatch.

InBatch also continues to support a proprietary RCP binary file for export or import or recipes only.

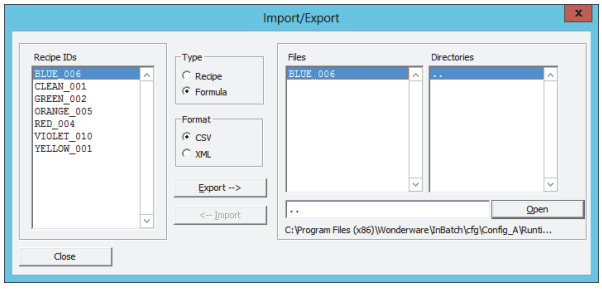


Figure 3. Recipe Formula Import and Export

Approved for Test

A recipe can be “Approved for Test”. Any recipe that is “Approved for Test” may be scheduled.

Formula Association to Procedure

The ability to associate formula input, output, and process variable values to phases and to easily edit them from the formula display is provided. Formulas can also be modified outside of InBatch in XML or CSV file formats.

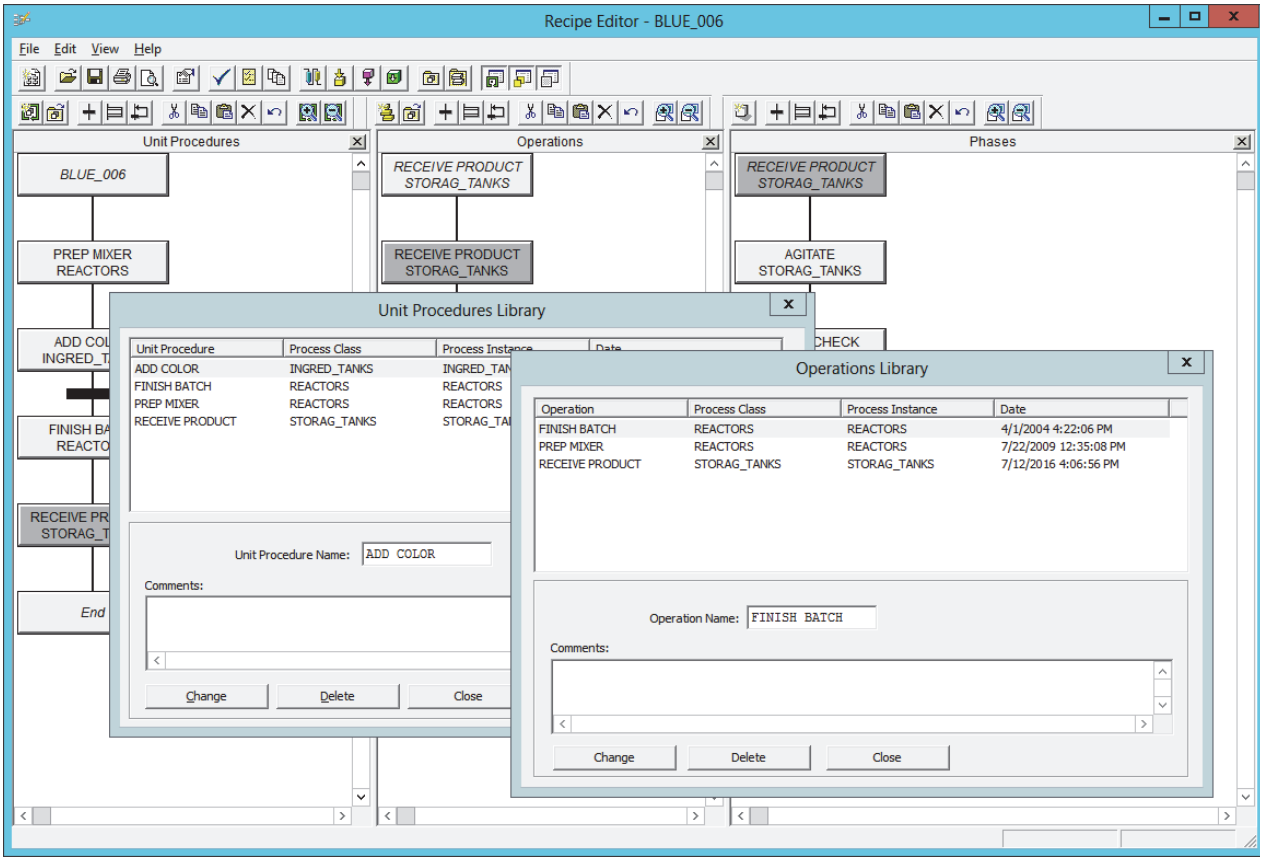


Figure 4. Batch Recipe Structure

Recipe Unit Procedure and Operation Libraries

You can save unit procedures to a procedures library and unit operations to an operations library. To accomplish this, you drag and drop the procedure or operation object on the appropriate library display. You can also retrieve and insert a procedure or operation from the appropriate library into a recipe procedure or operation in the same manner.

Recipe Types

You have the ability to define recipe types. This allows you to group recipes for easy retrieval and scheduling. Examples of recipe types include clean-in-process, barbecue sauce, salad dressing.

Recipe States

You have the ability to define recipe states. Examples of these states include Development, Production, Test, Review, Archive, and so forth. This allows you to group recipes for easy retrieval for editing.

Recipe Selection, Filtering, and Sorting

In order to manage large numbers of recipes, you can set the filter by state or type and can sort the list of recipes by Recipe ID, Recipe Name, State or Type.

Propagation of Process Model Changes

The Recipe Editor provides a function to

automatically propagate phase changes in the process model to all the affected recipes.

Recipe Editing Tools

Cut, copy, and paste menu commands and tools provide flexibility when editing elements in the recipe procedure.

Recipe Validation

The validation function allows you to validate one or all recipes to verify that:

- The process model database information used in the recipe exists
- The material database information used in the recipe exists
- The minimum, maximum, and default batch sizes defined in the recipe header are appropriate
- All the formula parameters defined in the recipe procedure are linked to the appropriate information
- All reports triggered by phases exist in the reporting database
- All transition logic, including loop logic, is valid.

Recipe Comparison

A Recipe Compare utility is available to compare (either different versions of the same recipe or two different recipes) and then view and save a generated report showing the differences between them. The recipes to compare must have been previously exported from RecipeEdit in XML format.This can be done automatically when recipes are saved and/or approved. The Recipe Compare report provides color-coded details about additions, deletions and modifications to the recipe configuration (for example, process variables added to a phase, changes to the equipment requirements, and so on).

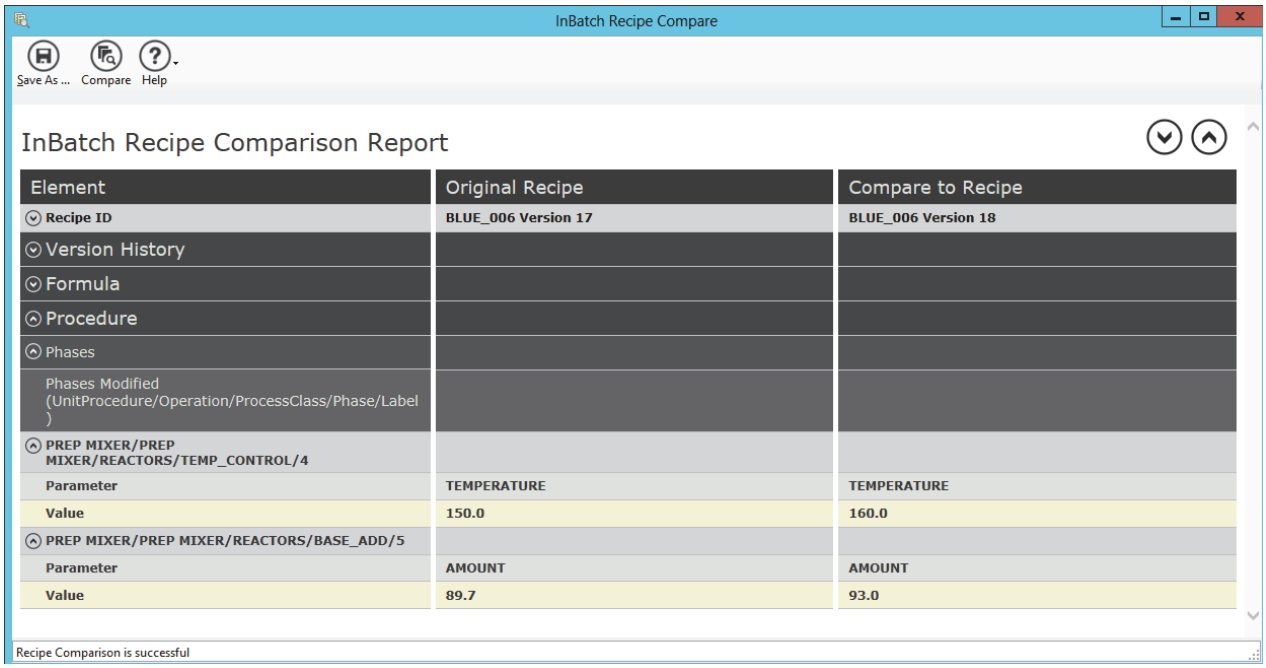


Figure 5. Recipe Comparison Report

Recipe Configuration Reports

You can print recipe configuration reports using the available report templates. All parts of the recipe can be printed using printers configured within the operating system.This includes non-PostScript™ printers, Microsoft XPS Document Writers, and others. Recipes can be printed to a file location as well. (refer to Figure 6).

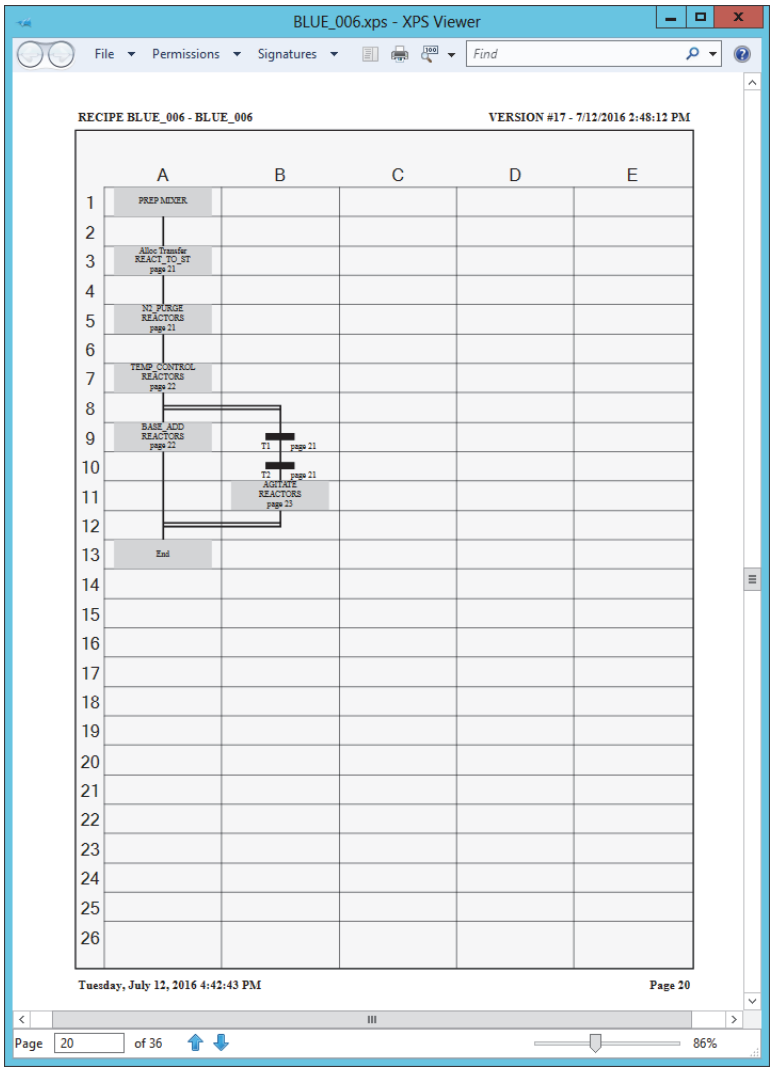


Figure 6. Example of a Recipe Procedure Printed with the Microsoft XPS Document Writer

PRODUCTION INFORMATION MANAGEMENT

Production information management comprises:

- Batch History Server for Batch History and Reporting functions
- Historian
- Batch, Equipment, and Security History
- Historian Archive Function
- Process Logger
- Reporting System

Batch Server

InBatch software uses a separate server for Batch History and Reporting functions (refer to Figure 7).

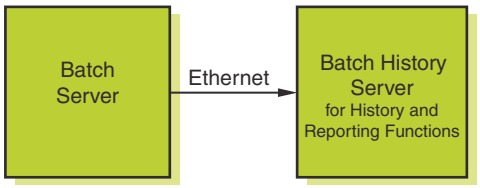


Figure 7. Batch System Architecture

The Batch Server maintains a history cache to ensure no loss of historical data in the event of a temporary communications failure.

Historian

Comprehensive batch, equipment, and security history and flexible real-time reporting are hallmarks of InBatch software. The Batch Historian uses Microsoft SQL Server to store batch history information.

Batch, Equipment, and Security History

InBatch software provides the most comprehensive batch historian available, capturing all Electronic Batch Record (EBR), equipment, and security events.

- EBR events are the event data the Batch Manager captures and logs to the Batch Historian when batches are executing (refer to Figure 8). All these events are stored with time, date, and batch ID for easy retrieval.

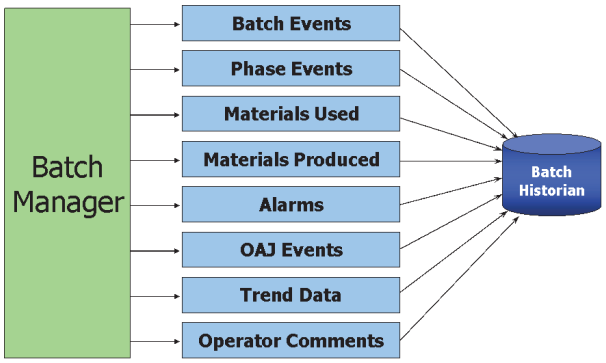


Figure 8. Batch History (EBR)

- Equipment events occur each time the status of a piece of equipment changes, and the Batch Manager captures and logs the change to the Batch Historian (refer to Figure 9). All these events are stored with the old status, new status, current recipe ID, and last recipe ID.

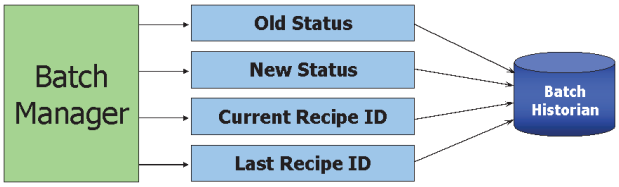


Figure 9. Equipment History

- Security events occur whenever the Batch Manager captures and logs security events to the Batch Historian (refer to Figure 10). Configuration edits include security database changes such as deleting a user and changing a user's password.

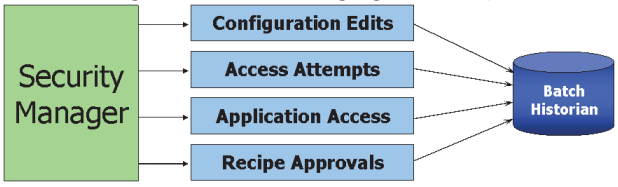


Figure 10. Batch Security History

History Archive Function

The History Archive function allows you to create, edit, and execute archiving tasks that are registered

by SQL Server. You identify the starting point and the ending point for archiving history data. The dates are inclusive, that is, all batches completed on or after the starting date and all batches completed on or before the ending date are archived. A batch is considered completed when it has obtained a status of Done or Aborted, and is closed (removed from the batch schedule). After an archive has been created, it can be deleted, restored or purged.

Process Logger

The Process Logger retrieves data and passes it to the printer or to the Batch Suite Historian for storage. The Process Logger Editor window creates data collection configurations, which consist of one or more groups of tags with each group having its own data collection configuration. The run-time Process Logger uses the logging configuration to determine how each group of tags and its respective values should be collected and logged. Data collection may be periodically scheduled or event driven.

Reporting System

With InBatch software, real-time reporting capabilities are available using Microsoft Reporting Services (SSRS) capabilities for configuring and viewing reports.

Client access licenses are required for viewing published reports on workstations in a network.

Reports are available to any workstation equipped with a network connection to the batch reporting server, a valid license, and an Internet browser. The reporting system offers end-of-batch reports and time triggers, such as time of day. Both batch and continuous data can be combined in one report.

InBatch software provides more than 20 report templates as examples for your use. You can run and view reports using the Reporting Services interface as shown in Figure 11.

Reports can retrieve any piece of information stored in the Batch Historian and can be used in a real-time or off-line mode. Refer to Figure 12.

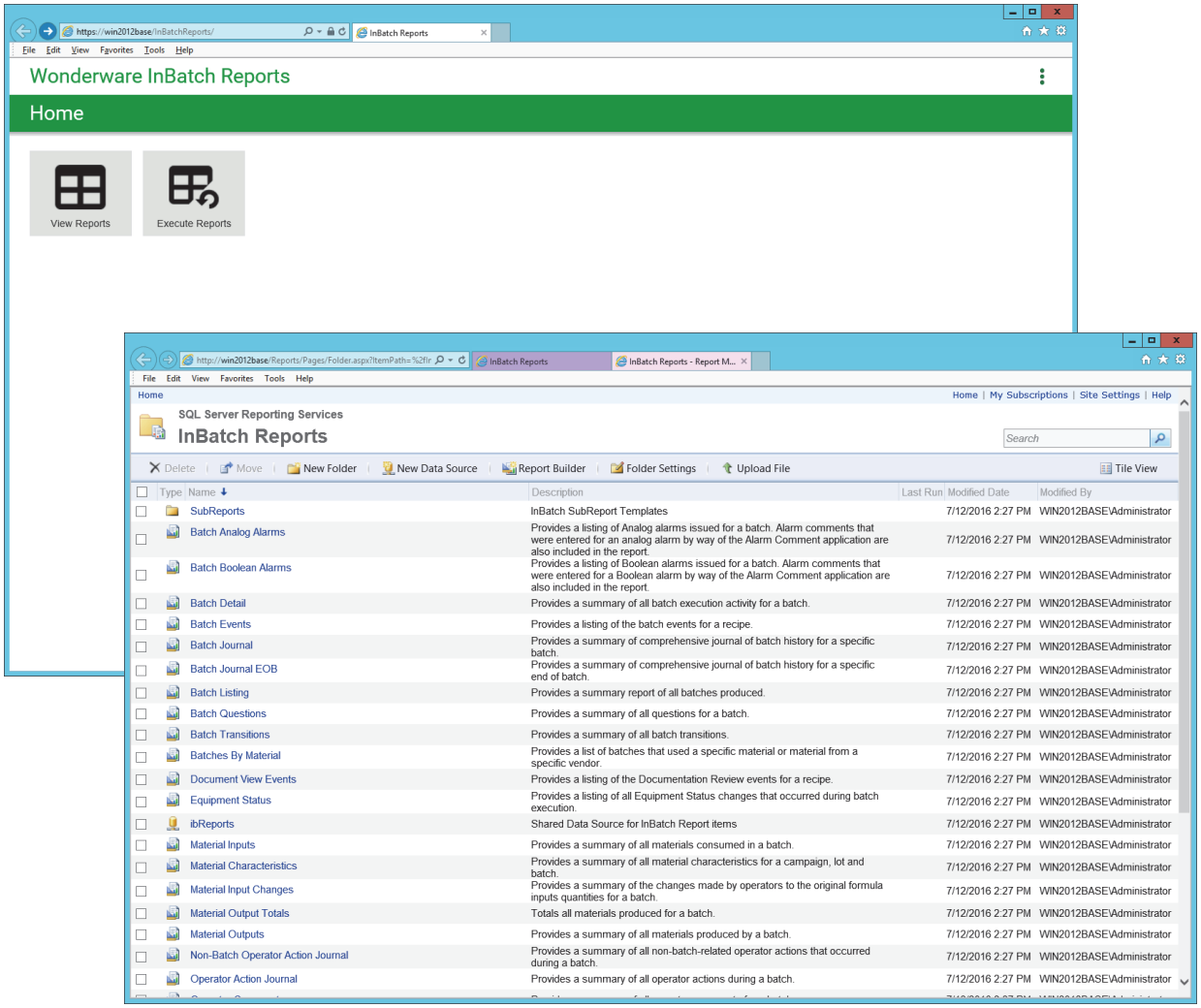


Figure 11. Batch Reports Interface via Reporting Services

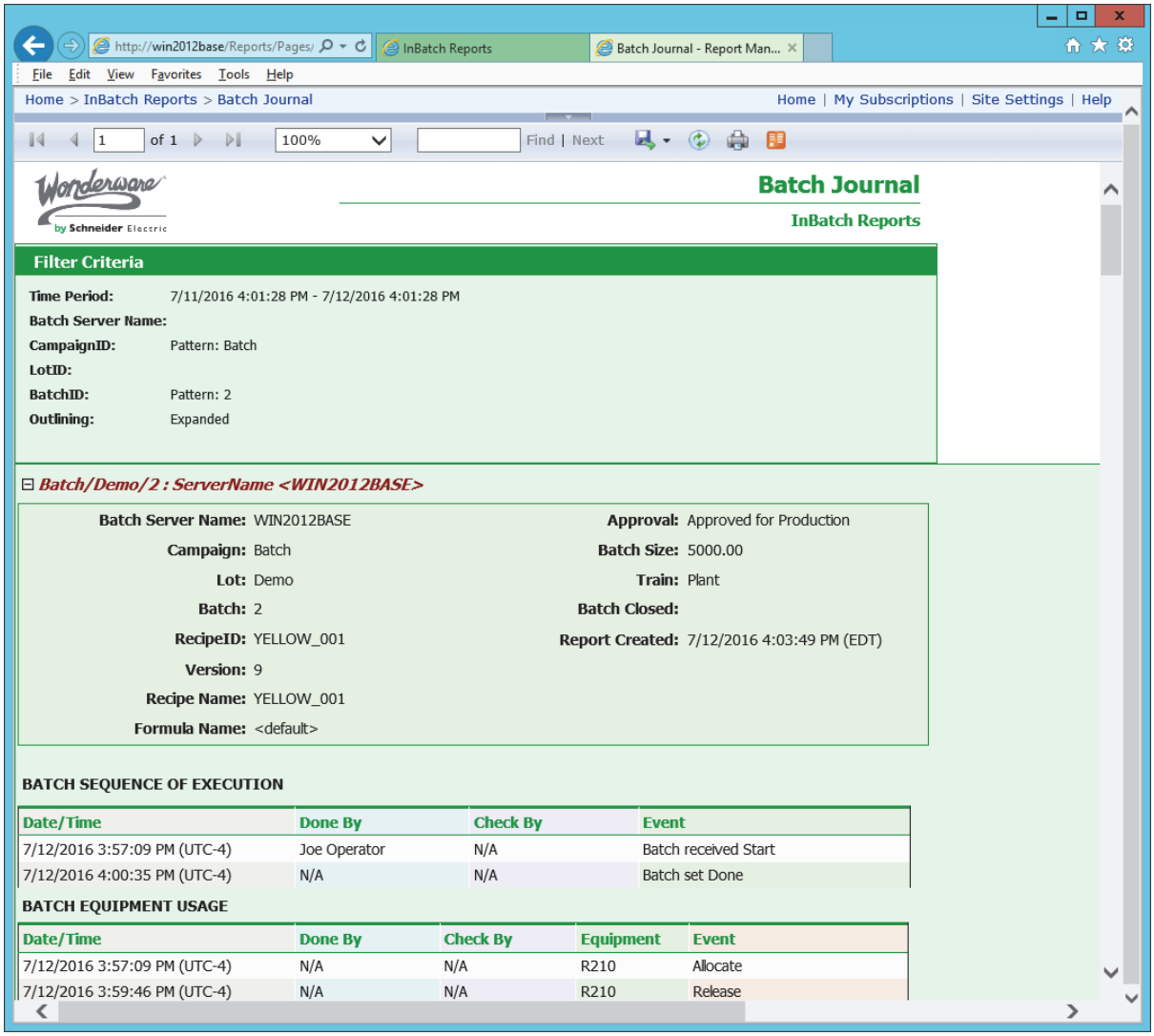


Figure 12. Sample Batch Journal Report

Examples of Batch report templates are:

- A listing of Foxboro Evo analog alarms issued for a batch (if installed with I/A Components)
- A summary of all batch execution activity for a batch
- A summary of all questions for a batch
- A listing of Foxboro Evo Boolean alarms issued for a batch (if installed with I/A Components)
- A summary of all material characteristics for a campaign, lot and batch
- A summary of the changes made by operators to the original formula input quantities for a batch
- A summary of all materials consumed in a batch

- A summary of all materials produced by a batch
- Totals of all materials produced for a batch
- A summary of all operator comments for a batch
- A summary of all recipe phase instructions for a batch
- A summary of all process log values for a batch
- Statistical information of all process log values recorded for a specific tag
- A summary of all process variable target and actual values for a batch
- A summary of changes made by operators to the original formula process variables for a batch
- A listing of Foxboro Evo sequence block messages issued for a batch (if installed with I/A Components)
- A list of batches that used a specific material or material from a specific vendor
- A summary report of all batches produced
- A summary report of all equipment status changes
- A summary of all finished products produced
- A summary report that includes the number of finished products produced, number of lots, number of batches and total quantity produced.

ENHANCED SECURITY OPTIONS

Standard Batch Security

InBatch software provides a standard security mode which may be used to control the access and manipulation capability of users. A security role is assigned to users based on their job functions such as operators, supervisors, engineers, and so forth. Only one security role can be assigned to a given user. New security roles can be added to the security system at any time, and there is no limit to the number of roles that can be defined.

InBatch applications and their associated functions can be assigned security roles defining which groups of users can access an application and which groups can execute and verify the various functions available within that application. The Batch applications include Batch Display, Batch Scheduler, Process Model Editor, Recipe Editor, and so forth. Each application can be assigned one or more security access roles permitting groups of users to access the application. Applications can be added to the security system at any time.

The Batch software supports security for execution and verification of the functions available within an application. As an example, the Batch Display application includes functions such as Abort Batch, Allocate Equipment, Start Batch, Unit Hold, and so forth. Each function can be assigned one or more Done By and Check By security roles. More than one role can be permitted to perform or verify a function, for example, both operators and supervisors could be permitted to perform a function, but only supervisors could verify the function. Functions can be added to the security system at any time.

Recipe and operator station security assignments are made on a per user basis.

Recipe assignments protect against operators working on products for which they have not been trained. None, one, many, or all recipes can be assigned to a user. Security for the recipe delete function prevents an unauthorized user from deleting a master recipe.

Operator station assignments protect against operators working at operator stations to which they should not have access. None, one, many, or all operator stations can be assigned to a user.

Each user has an account consisting of a user name containing a maximum of 30 characters and a user identification containing a maximum of 12 characters.

When a security clearance is required, the security system prompts the user for an ID and password. The permitted number of requests for security clearance can be limited and access denied if the number of retries is exceeded by a user.

The system supports password time-out (the number of days a password is valid) and password reuse (the number of day which must pass before a password can be re-used). All passwords in the security system are stored and transmitted in an encrypted format.

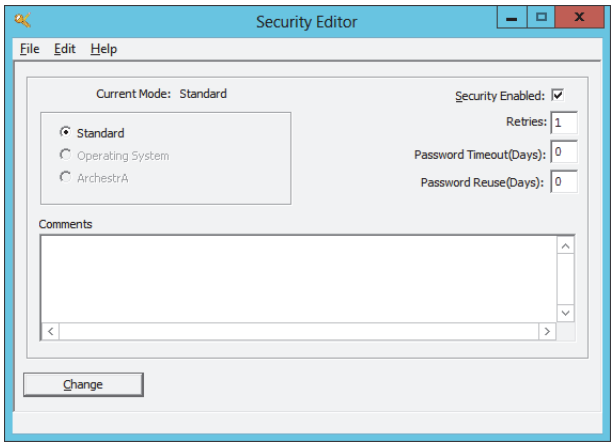


Figure 13. InBatch Security Editor Configuration

Operating System Batch Security

InBatch software provides an operating system batch security mode in which user authentication is performed against user data stored in the Windows operating system instead of in the InBatch security database. Users are selected from a list of configured users on the Windows operating system. For Operating System mode, a domain or local computer name is also required. If InBatch is used with I/A Components, Operating System security mode is available when the InBatch software is installed on a system using the security enhanced Foxboro Evo software.

ArchestrA Security

InBatch software provides an ArchestrA Security mode in which user authentication is performed against user data stored in the Galaxy and verified by Wonderware Application Server instead of in the InBatch security database. Users are selected from a list of configured users in the ArchestrA Integrated Development Environment. ArchestrA Security mode is not available when the InBatch software is installed with I/A Components.

User Access Activity Report

A report query template is provided to retrieve security administration and user access activity from history for display or printout.

Support for Electronic Records and Electronic Signatures Regulations

InBatch software has been designed for use in validated processes that must comply with the FDA 21 CFR Part 11 on Electronic Records and Electronic Signatures and EudraLex Annex 11. A white paper describing the regulation and how the Batch software helps users comply with the regulation is available. See *Wonderware InBatch 21CFR Part 11 Deployment Guide Revision A June 2016.*

ENVIRONMENT MANAGEMENT SYSTEM

The Environment Management capability provides a controlled interface so you can monitor and manipulate the Batch Server applications and configurations in both the configuration and run-time environments. The Environment Management capability is configurable using the Environment Editor. The editor is used to define the applications that can run in the configuration or run-time environments and to set option switches for executables. The Environment display shows editor icons and run-time GUI-based applications that you can select and run. Additionally, you can start and stop background applications, monitor their status

and start and stop individual editor and display applications.

Listed below are the significant functions of the Environment Management capability:

- Copy Edit Model to Run Model
- Copy Run Model to Edit Model
- Start All Applications
- Stop All Applications
- Start Application
- Stop Application
- Edit Environment and Configure Applications Switches
- Update Environment
- Exit and Shutdown
- Exit.

PROGRAMMATIC INTERFACES TO INBATCH SOFTWARE

These functions are included with the Batch Server license at no additional charge.

ActiveX Controls

InBatch software includes four categories of ActiveX controls that provide access to runtime batch information. You can use these to develop custom batch interface applications within COM-based environments such as Visual Studio and Wonderware InTouch.

Batch SFC ActiveX Control

The Batch SFC ActiveX control (InBatchSFC.ocx) enables the runtime sequential function chart representation of an active batch to be used in the container application. This SFC is the same as shown on the Batch Display application.

Batch ActiveX Control

The Batch ActiveX control (OcxBatch.ocx) provides access to the runtime schedule and display information for active batches. You use this control to develop custom applications that provide the following functionality:

- Add, change, and delete batch schedule data
- View, select, and control current active batches
- View and modify active and inactive phases and parameters for a running or scheduled batch
- View and modify phase properties for a running batch
- View and answer questions for a running batch
- View and change equipment allocation data for a running batch
- View and force active transition logic expressions for a running batch
- View batch errors and batch messages

Batch GUI ActiveX Controls

The Batch GUI ActiveX controls (GUIControls.dll) are a collection of four controls (configuration, batch field, batch list, and batch button) that provide access to the runtime schedule and display information for active batches. The GUI controls are pre-defined controls that can be used to easily assign any available batch field, list, or button behavior to the control instance. These controls can be used to very quickly and easily develop a custom batch user interface application.

Batch Security ActiveX Control

The Batch Security ActiveX control (BatchSecCtrl.dll) provides access to the standard InBatch security system including application and function security clearance.

.NET Controls

In addition to the ActiveX Controls, InBatch also includes a set of .NET controls that can be used to access runtime batch information within newer platforms such as ArchestrA Graphics. These controls mirror the ActiveX GUI Controls including the batch list, batch field, batch button, and configuration. A Batch SFC .NET control is also provided.

COM Automation Servers

InBatch software includes two Automation Servers that provide access to the material and the recipe databases. Each server is comprised of a set of object classes that contain a variety of methods and properties. You can use these to develop custom applications within COM-based environments such as Visual Studio™.

Materials Database Automation Server

The Materials Database Automation Server (MaterialSrv.exe*)* provides read and write access to the materials database. You use the server to develop custom applications that provide the following functionality:

- Add, change, and delete materials (ingredients, intermediates, etc.)
- Define default characteristics for a material
- Query and assign available units to a material
- Add and remove lot tracking information for a material assigned to a unit
- Query material lot tracking information
- Define actual characteristic values for a specific lot of material
- Find the location of a material
- Query the contents of a unit
- Query the total quantity of a material.

Recipe Database Automation Server

The Recipe Database Automation Server (*RecipeEdit.exe*) provides read and write access to the recipe database. You use the server to develop custom applications that provide the following functionality:

- Add, change, and delete recipes
- Query and change recipe header information
- Query and change recipe equipment requirements
- Query formula inputs defined for a recipe
- Query formula outputs defined for a recipe
- Define and modify the formula for a recipe
- Define a recipe procedure.

Batch Function Interface Libraries

InBatch software includes two type libraries that define an interface from which you can create an in-process server (dll) to interact with the batch function interface. Each type library is comprised of a set of object classes that contain a variety of methods and properties. You can use these to develop custom servers with COM-based environments such as Visual Studio.

The Batch Hooks Type Library (*batchvbserver.dll*) includes functions and subroutines that can be used to access the batch function interface. The batch function interface consists of several hooks into the execution of Batch Manager. Adding logic to these hooks allows you to extend the capabilities of Batch Manager.

The Batch Object Type Library (*batchobjsrv.dll)* provides objects that contain the appropriate batch, phase, parameter, and equipment data available and modifiable within the hooks.

Stateless Application Programming Interface (API)

InBatch includes a stateless API that contains many of the functions available in the Batch ActiveX Control. This API can be referenced within Visual Studio and within ArchestrA application objects developed using the ArchestrA Integrated Development Environment (IDE) and InBatch without I/A Components. You use this API to provide the following functionality:

- Add, delete, and query batch schedule data
- Select and control current active batches
- Allocate and release equipment
- Query batch security configuration.
- Add, delete, and query train data
- Import and export recipes

- Validate, approve, and compare recipes

InBatch ArchestrA Events

The InBatch Server is an Event Provider to the ArchestrA Event Services platform, which in turn uses the ArchestrA Service Bus (ASB) for sending and receiving data. The events are primarily related to state changes during the execution of batches. Each event contains an "Event Type" and also relevant context data properties associated with the event type. Events are fired to a local Event Service where they are queued and made available to interested clients. Event clients can connect to the Event Service and poll for new events. The event client can then use the event and its context data properties to perform external/custom actions. If Batch Events are enabled on an InBatch Server, those events can be retrieved and used by any ArchestrA Event Services compatible client.

LOCALIZATION AND REGIONAL SETTINGS

InBatch is designed to facilitate localization. The default language of InBatch is US-English.

There are three different repositories for localization in InBatch:

- BatchServer
- Admin Web
- Report Web

You can localize the user interface, messages, and all features of InBatch with the exception of several applications and interfaces as described in the user documentation.

UPGRADING TO INBATCH SOFTWARE

Information about migration of Model, Recipe, Material, Link, Logger, and Security databases to InBatch 2014 R3 (v11.5) for previous versions of RBATCH, I/A Series Batch and InBatch software is available upon request. Contact Global Client Support (GCS) for additional information.

FOXBORO EVO INTEGRATION

Associations between equipment and a batch are dynamically made in the control package so that any batch related alarm messages contain the Batch ID. This ensures data integrity when queries are made later on the Batch Historian and obviates the need to infer associations between equipment and a batch based on time.

Using the Batch display for a given batch, you can launch FoxAlert software with match filtering automatically set to the Batch ID of that batch. This ensures that only those alarms that pertain to that batch are displayed in this view (refer to Figure 14). Phase and formula parameter descriptions are available from the Batch display.

Phase logic is implemented using Foxboro Evo sequence blocks and can be configured and displayed in a graphical format that follows the IEC 61131-3 standard. When viewing a phase from the Batch display, you can launch the SFC/ST display for that phase (if it was configured using the SFC/ST Configurator) to quickly and easily determine, via highlighting, where you are in that phase and to view the live, updating evaluation of any active transitions (refer to Figure 14). This greatly reduces the time to debug and commission phase logic as well as provides a handy tool to operations people for ongoing support.

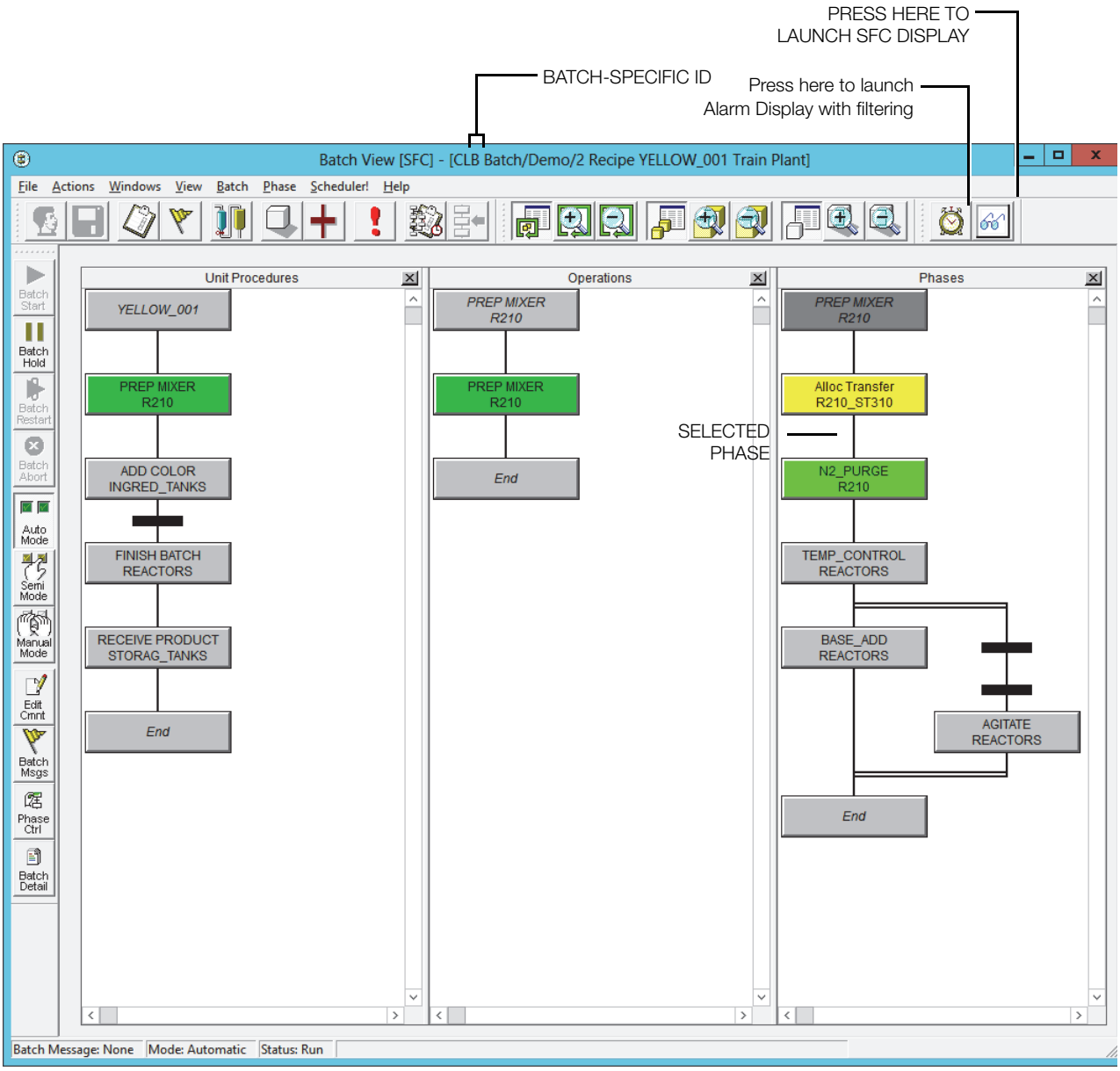


Figure 14. Integration with Alarm Alert and SFC/ST Display Manager

When installed without the I/A Components, InBatch software is still well integrated with the rest of the Foxboro Evo platform, but the integration is done using the Foxboro Control Software (FCS) rather than the integration options described above.

Communication to the Foxboro Evo control system is done using the Foxboro Evo Device Integration Object (IADI) and/or the Foxboro Evo Data Access Server (IADAS).

ARCHESTRA INTEGRATION

When installed without the I/A Components, InBatch software includes several features for tightly integrating the software to the rest of the ArchestrA infrastructure including Foxboro Evo software. Batch tags can be linked to the galaxy repository and a communication software module (IBMX) is available to communicate with ArchestrA rather than directly to the control system. ArchestrA objects and attributes can be browsed and assigned within the batch tag linker application. Standard batch security can be enhanced to support operating system or ArchestrA security. In addition, the ActiveX controls can be used to develop a tightly integrated human machine interface if using Wonderware InTouch software.

BATCH SYSTEM CONFIGURATION

The InBatch system is comprised of several components including Batch Server, Runtime Client, Development Client, History Server, Reporting Content. A utility is used to configure each component. See Figure 15.

The InBatch server is scalable and available in three sizes: large, medium, and small. The number of runtime and development stations is selectable.

The Batch Server license includes the Runtime Client and the Development Client functionality, giving access to all product capabilities from the Batch Server workstation. Additional Runtime and Development clients may be installed on other workstations as required.

The History Server and Reporting Content can be installed on one workstation or split onto two different workstations. The InBatch server as well as the batch history and reporting server must be server class computers.

Virtualization is supported with InBatch for the batch servers, batch history and reporting server, as well as the batch clients. Hyper-V and VMware are the supported hypervisors. Hyper-V is the only qualified hypervisor when InBatch is configured with the I/A Components.

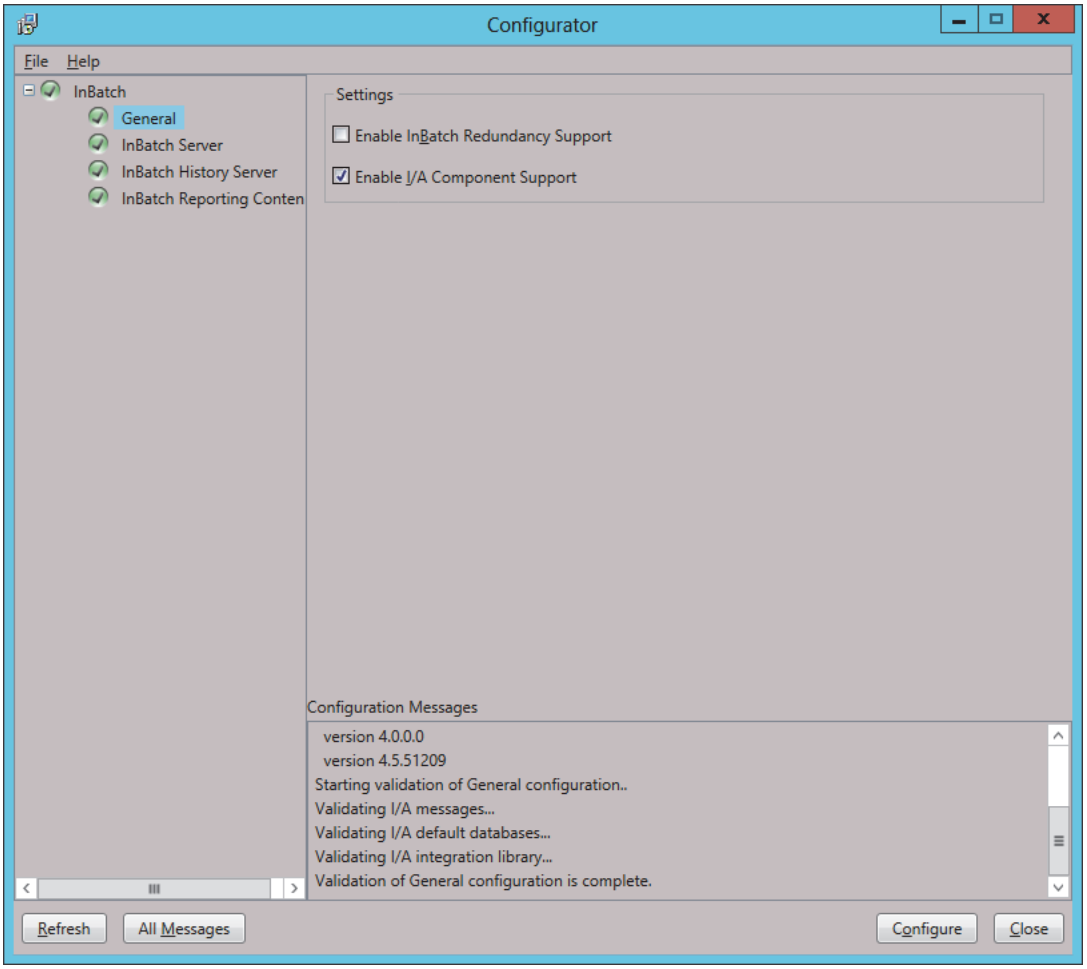


Figure 15. Configurator Showing Several InBatch Options

Redundant Batch Server Option

Batch Server redundancy capabilities allow the server to automatically switch batch control to a backup server in the event of a primary server shutdown due to a hardware failure or power loss. Two identical servers are required to configure a redundant system (refer to Figure 16).

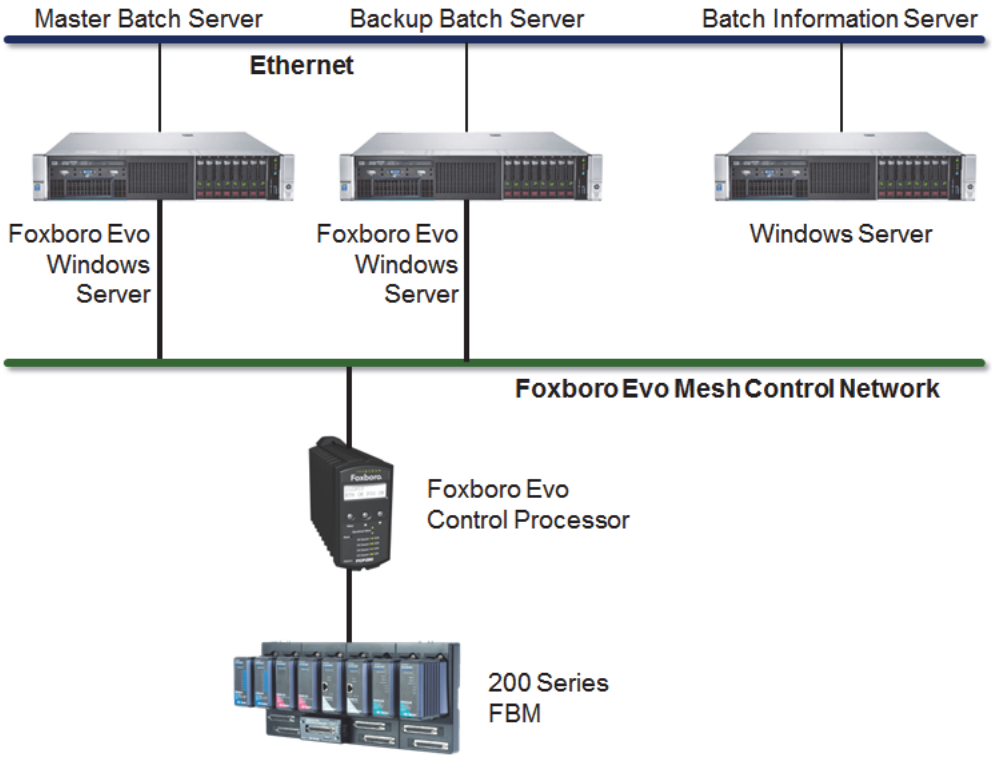


Figure 16. Batch Server Redundancy

InBatch Software and Remote Desktop Services

InBatch software supports remote desktop services for batch Runtime and Development clients. The batch client remote desktop services software must be installed and licensed on a server other than the Batch server. See Figure 17.

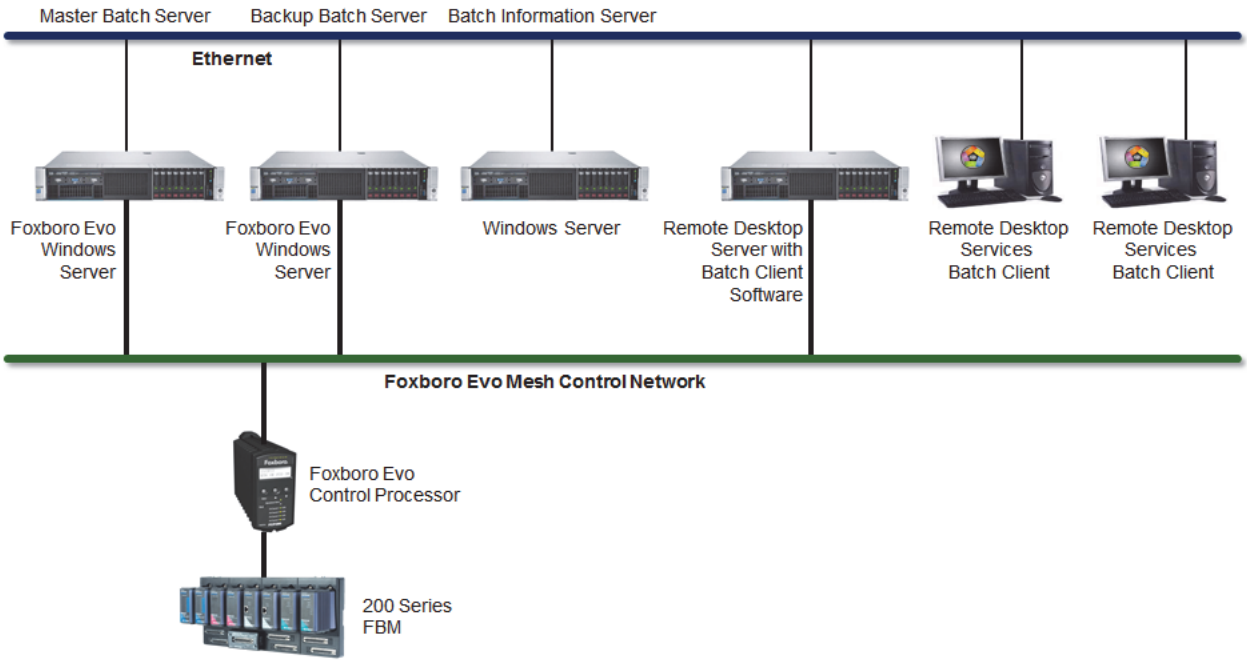


Figure 17. InBatch Software and Remote Desktop Services

ETHERNET NETWORKS

Ethernet networks (in addition to The Mesh control network) are required between the Batch Server and Batch Clients. Refer to Figure 18.

BATCH HISTORY SERVER

The Server for Batch History and Reporting functions rely heavily on resource-intensive SQL Server, Internet Information Server, and Reporting Services (SSRS). This requires a powerful computer.

Operating System Considerations

The server for Batch History and Reporting functions is deployed on a supported platform - refer to Table 2 on page 28.

Hardware Considerations

When evaluating the hardware for use with the server that will be performing Batch History and Reporting functions, you should consider failure of the disk drive, network interface card, and power supply.

Disk subsystems (controllers/disk) should use Serial Attached SCSI (SAS) or Serial ATA (SATA) interfaces, and should ideally be a hardware RAID. When RAID configurations are not used, the SAS and SATA interfaces provide a level of fault tolerance, since the Windows operating system dynamically relocates detected disk errors to good sectors.

SQL Server, a significant disk resource consumer, also has specific system requirements that

necessitate separate hard drives for the database and database log for recovery purposes.

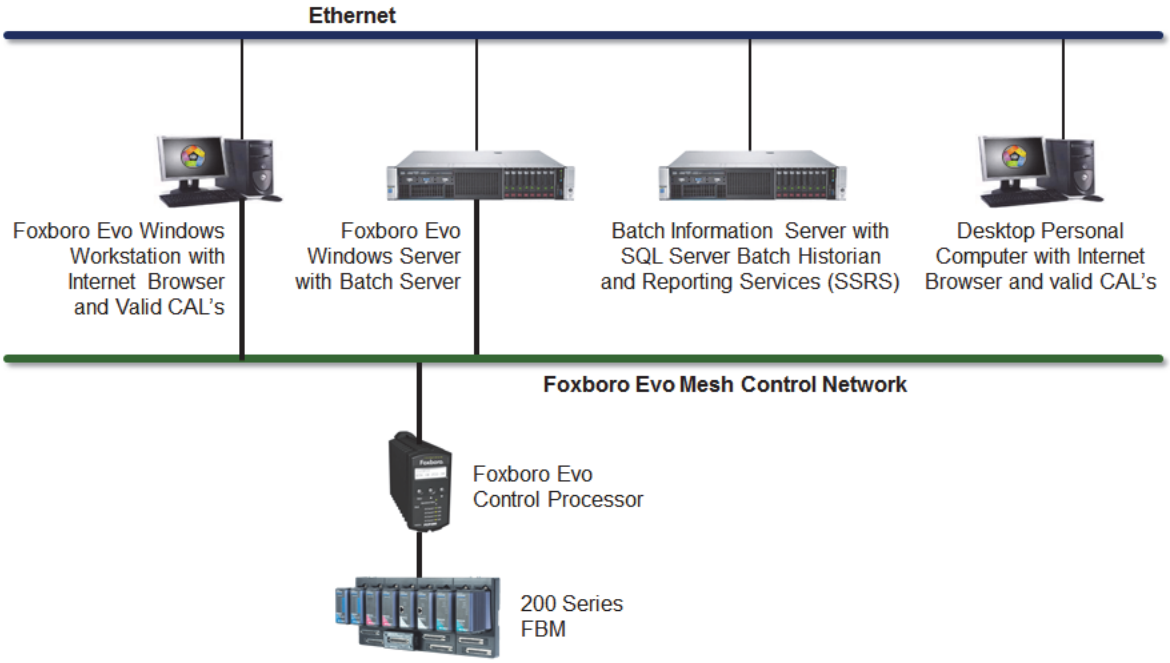


Figure 18. Batch Reporting System Configuration

Basic Production System

For a minimum configuration, disregarding fault resilience and performance concerns, the following platform is sufficient: a current Intel® compatible processor, 8 GB memory, three SAS or SATA disk drives (OS, database, and database logs), and an optional tape or R/W DVD drive.

Power Production System

Multiple processors help to ensure processor availability during extreme non-OLTP (On-Line Transaction Processing). Reporting demands can change the processor requirements dramatically.

A RAID configuration utilizing two disk drives at RAID1 and four drives at RAID5 is ideal. The operating system, application software, and database logs are on mirrored drives (RAID1).

The database is on three drives at RAID5 with data parity striped across all drives. For additional performance, RAID10 can be used. A hot spare drive (RAID5) is included to rapidly recover from reduced performance and to increase availability.

BATCH SOFTWARE FUNCTIONAL SPECIFICATIONS

Process Model
There are no absolute limits on the number of process units or connections. The only limitation is hard disk space in the host processor.

Maximum Number of Formula Variables per Phase when Downloading to an I/A Series Sequence Block
24 booleans, 8 integers, 15 reals and 10 strings
{Note: These limitations do not apply when downloading to multiple blocks.}

Maximum Number of Recipes
Unlimited. The only limitation is hard disk space in the host processor.

Maximum Number of Serial Steps (Operations) in a Recipe
510

Maximum Number of Serial Steps (Phases) in an Operation
510

Maximum Number of Phases for Operator Selection of Parallel Execution
20

RECOMMENDED MINIMUM HARDWARE REQUIREMENTS

The following hardware is recommended to support InBatch 2014 R3 (v11.5):

- Processor: 3.0 gigahertz (GHz) or faster processor with 4 processor cores
- RAM: 8 gigabytes (GB) of memory
- Hard disk: At least 500 GB of available disk space
- Video adapter and monitor with super VGA (1024 × 768) resolution or higher
- CD-ROM or DVD drive for installation
- Keyboard

Mouse or compatible pointing device

Refer to your specific Microsoft operating system hardware requirements for details.

I/A SERIES AND FOXBORO EVO SOFTWARE COMPATIBILITY

InBatch 2014 R3 (v11.5) is compatible and can co-exist with the following products:

- Foxboro Evo Control Software v9.0, v9.1 and v9.2
- I/A Series Software v8.7 and v8.8

InBatch also supports the Foxboro Evo Microsoft Hyper-V hypervisor solution.

You must install Microsoft .NET Framework 4.5.2 before installing Wonderware InBatch 2014 R3 (v11.5). If this version of the .NET Framework is not installed on the station, the Wonderware InBatch installation automatically installs it.

Refer to the following tables for more specific requirements.

Table 1. InBatch 2014 R3 (v11.5) Software Operating System Requirements for Foxboro Evo Stations

Operating Systems		Service Pack Level	InBatch Features					
			Server	Run-time Client	Develop-ment Client	History Server	Reporting Content	Redundant System
H90 Windows Server 2008 R2	64-bit only	SP1	Yes	Yes	Yes	Yes	Yes	Yes
H92 Windows 7	32/64-bit	SP1	No	Yes	Yes	No	Yes	Yes

OPERATING SYSTEM SOFTWARE COMPATIBILITY

Table 2. 2014 R3 (v11.5) Software Operating System Requirements for Off Platform Stations

Operating Systems		Service Pack Level	InBatch Features					
			Server	Run-time Client	Develop-ment Client	History Server	Reporting Content	Redundant System
Windows Server 2008 R2 Standard	64-bit	SP1	Yes	Yes	Yes	Yes	Yes	Yes
Windows Server 2008 R2 Enterprise	64-bit	SP1	Yes	Yes	Yes	Yes	Yes	Yes
Windows Server 2012 Standard	64-bit		Yes	Yes	Yes	Yes	Yes	Yes
Windows Server 2012 Data Center	64-bit		Yes	Yes	Yes	Yes	Yes	Yes
Windows Server 2012 R2 Standard	64-bit		Yes	Yes	Yes	Yes	Yes	Yes
Windows Server 2012 R2 Data Center	64-bit		Yes	Yes	Yes	Yes	Yes	Yes
Windows 7 Professional	32-bit & 64-bit	SP1	No	Yes	Yes	No	Yes	Clients only
Windows 7 Enterprise	32-bit & 64-bit	SP1	No	Yes	Yes	No	Yes	Clients only

Table 2. 2014 R3 (v11.5) Software Operating System Requirements (Continued)for Off Platform

Operating Systems		Service Pack Level	InBatch Features					
			Server	Run-time Client	Develop-ment Client	History Server	Reporting Content	Redundant System
Windows 7 Ultimate	32-bit & 64-bit	SP1	No	Yes	Yes	No	Yes	Clients only
Windows 8 Professional	32-bit & 64-bit		No	Yes	Yes	No	Yes	Clients only
Windows 8 Enterprise	32-bit & 64-bit		No	Yes	Yes	No	Yes	Clients only
Windows 8.1	32-bit & 64-bit		No	Yes	Yes	No	Yes	Clients only
Windows 10	64-bit		No	Yes	Yes	No	Yes	Clients only
Windows 8 Enterprise	64-bit		No	Yes	Yes	No	Yes	Clients only

NOTE

For InBatch IDE Configuration Tools Extension software requirements, see software requirements for Wonderware Application Server.

MICROSOFT SQL SERVER SOFTWARE COMPATIBILITY

Table 3. InBatch 2014 R3 (v11.5) Software Microsoft SQL Server Database Requirements

Version	Type	Service Pack Level
Microsoft SQL Server 2008 R2	Standard or Enterprise Edition	SP1, SP2
Microsoft SQL Server 2012	Standard or Enterprise Edition	SP1, SP2
Microsoft SQL Server 2014	Standard or Enterprise Edition	

FOXBORO EVO ADDITIONAL SOFTWARE COMPATIBILITY

Table 4. 2014 R3 (v11.5) Software Additional Software Requirements for Each Foxboro Evo Station Type

Additional Software Requirements	InBatch Features					
	Server	Run-time Client	Develop-ment Client	History Server	Reporting Content	Redundant System
Foxboro Evo Control Software v6x	Yes	-	-	-	-	-
Foxboro Evo Control Core Services v9.0, v9.1, v9.2	Yes	Yes	Yes	-	-	Yes
I/A Series Software v8.7, v8.8	Yes	Yes	Yes	-	-	Yes
Internet Information Services (IIS) 7.0 or 8.0	-	-	-	Yes	-	-
Reporting Services (SRSS)	-	-	-	-	Yes	-

INBATCH 2014 R3 (V11.5) SOFTWARE PART NUMBERS

The following tables list the software license part numbers, Batch Backup Server part numbers, and related product part numbers.

Table 5. 2014 R3 (v11.5) Software License Part Numbers

Part Number	Title	Description
62-0158	InBatch Server 2014 R3, Large	Wonderware InBatch 2014 R3 can be used standalone or integrated with Foxboro Evo.Wonderware InBatch 2014 R3 supports the H9x family of servers and workstations, I/A Series 8.7 and 8.8 software releases, and Foxboro Evo Control Core Services 9.0, 9.1, and 9.2 This Batch Server license is for unlimited units. The InBatch Server license includes Runtime Client and Development Client functionality and a Device Integration Servers license on the InBatch Server node, one (1) Microsoft SQL Server Standard Edition, one (1) WW CAL with MS CAL.
62-0159	InBatch Server 2014 R3, Medium	Wonderware InBatch 2014 R3 can be used standalone or integrated with Foxboro Evo.Wonderware InBatch 2014 R3 supports the H9x family of servers and workstations, I/A Series 8.7 and 8.8 software releases, and Foxboro Evo Control Core Services 9.0, 9.1, and 9.2 This Batch Server license is for 16-40 units. The InBatch Server license includes Runtime Client and Development Client functionality and a Device Integration Servers license on the InBatch Server node, one (1) Microsoft SQL Server Standard Edition, one (1) WW CAL with MS CAL.
62-0160	InBatch Server 2014 R3, Small	Wonderware InBatch 2014 R3 can be used standalone or integrated with Foxboro Evo.Wonderware InBatch 2014 R3 supports the H9x family of servers and workstations, I/A Series 8.7 and 8.8 software releases, and Foxboro Evo Control Core Services 9.0, 9.1, and 9.2 This Batch Server license is for 1-15 units. The InBatch Server license includes Runtime Client and Development Client functionality and a Device Integration Servers license on the InBatch Server node, one (1) Microsoft SQL Server Standard Edition, one (1) WW CAL with MS CAL.
62-0161	InBatch Redundant Server 2014 R3, Large	This license supports a redundant InBatch Server for unlimited units. This license requires that you have part 62-0158, Wonderware InBatch Server 2014 R3, Large in place.

Table 5. 2014 R3 (v11.5) Software License Part Numbers (Continued)

Part Number	Title	Description
62-0162	InBatch Redundant Server 2014 R3, Medium	This license supports a redundant InBatch Server for 16-40 units. This license requires that you have part 62-0159, Wonderware InBatch Server 2014 R3, Medium in place.
62-0163	InBatch Redundant Server 2014 R3, Small	This license supports a redundant InBatch Server for 1-15 units. This license requires that you have part 62-0160, Wonderware InBatch Server 2014 R3, Small in place.
62-0164	InBatch Runtime Client 2014 R3	InBatch Runtime Client allows use of the Batch Client application, use of InBatch software ActiveX controls in an InTouch or third-party container application. InTouch software is purchased separately.
62-0164T	InBatch Runtime Client 2014 R3, RDS	InBatch Runtime Client Remote Desktop Services (RDS) is a runtime license to use InBatch Client application and ActiveX controls on a Remote Desktop Server. One Runtime Client RDS license per session is required - the server console counts as one session.
62-0164TP	InBatch Runtime Client 2014 R3, RDS	InBatch Runtime Client Remote Desktop Services (RDS) is a runtime license (paper) to use InBatch Client application and ActiveX controls on a Remote Desktop Server. One Runtime Client RDS license per session is required - the server console counts as one session.
62-0164TF	InBatch Runtime Client 2014 R3, RDS FLB	InBatch Runtime Client RDS FLB is a runtime license to use InBatch Client application and ActiveX controls on an additional Failover/Load balancing Terminal Server for high availability of Terminal Server based operator client concepts (order the same amount of RT failover clients as you order for the primary Terminal Server).
62-0164TPF	InBatch Runtime Client 2014 R3, RDS FLB	InBatch Runtime Client RDS FLB is a runtime license (paper) to use InBatch Client application and ActiveX controls on an additional Failover/Load balancing Terminal Server for high availability of Terminal Server based operator client concepts (order the same amount of RT failover clients as you order for the primary Terminal Server).
62-0165	InBatch Development Client 2014 R3	InBatch Dev Client provides configuration capability for InBatch on an additional workstation. It provides all batch editors, including Model Editor and Recipe Editor, and permits batch configuration from a remote client.

Table 5. 2014 R3 (v11.5) Software License Part Numbers (Continued)

Part Number	Title	Description
62-0165T	InBatch Development Client 2014 R3, RDS	InBatch Dev Client RDS is a Dev license to use InBatch configuration client capability through a Remote Desktop Server session. One license per session is required - the console counts as one session.
62-0165TP	InBatch Development Client 2014 R3, RDS	InBatch Dev Client RDS is a Dev license (paper) to use InBatch configuration client capability through a Remote Desktop Server session. One license per session is required - the console counts as one session.

Table 6. Advantage Upgrade Part Numbers

Part Number	Title
Special Advantage pricing may be used for migrations from FoxBatch software and from previous versions of RBATCH, I/A Series Batch software or InBatch software. Advantage pricing on InBatch software licenses may also be extended to competitive migration projects. Contact Global Client Support (GCS) for additional information. Additionally, information about upgrading from all previous Foxboro® Batch products, including FOX 1/A™ Batch, EasyBatch™, Batch Plant Management, RBATCH™, and RBATCH II™ software is available upon request.	
P0998HV	UpgDoc 62-0158 to InBatch 2014 R3, Large Unlimited
P0998HW	UpgDoc 62-0159 to InBatch 2014 R3Medium 16-40 units
P0998HX	UpgDoc 62-0160 to InBatch 2014 R3Small 1-15 units
P0998HY	UpgDoc 62-0161 to Redundant Server 2014 R3 Large
P0998HZ	UpgDoc 62-0162 to Redundant Server 2014 R3 Medium
P0998JA	UpgDoc 62-0163 to Redundant Server 2014 R3 Small
P0998JB	UpgDoc 62-0164 to InBatch Runtime Client 2014 R3
P0998JC	UpgDoc 62-0164T to InBatch Runtime Client 2014 R3 RDS
P0998JD	UpgDoc 62-0164TF to InBatch Runtime Client 2014 R3 RDS FLB
P0998JE	UpgDoc 62-0165 to InBatch Development Client 2014 R3 RDS
P0998JF	UpgDoc 62-0165T to InBatch Development Client 2014 R3 RDS

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