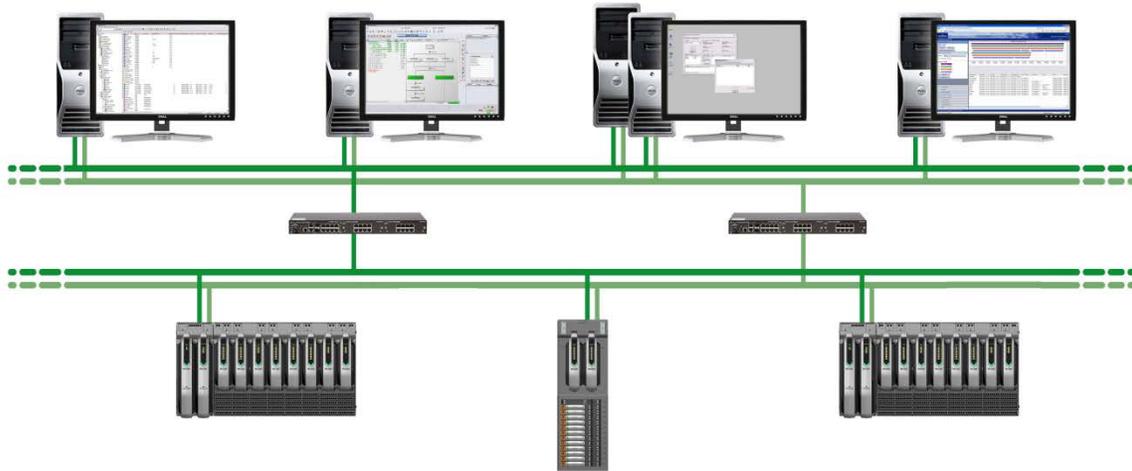# Batch Redundancy

Batch Redundancy provides high plant availability for batch operations.

- High plant availability for batch operations

- Helps ensure safety by minimizing disruptions to critical processes

- Redundant Campaign Manager mitigates potential risk to operations management and business planning systems

- Automatic switchover

- Online upgradable

Introduction

How much does the cost of one lost batch mean to your bottom line? Do you struggle to figure out how to perform routine maintenance or software upgrades in your batch operations?

Eliminate a single point of failure in your system with redundant Batch Executives and no longer worry about an unexpected failure of the Batch Executive or the Application Station interrupting your batch operations and causing costly downtime.

The redundant Batch Executives reside on a dedicated pair of Application Stations. When the active station fails, the standby automatically takes over, meaning your batch operations continue running smoothly.

Batch Redundancy

Benefits

High plant availability for batch operations.
DeltaV Batch redundancy consists of an active and a standby Batch Executive. If the active Batch Executive or its associated Application Station detects a failure, the standby Batch Executive automatically assumes the active role. Your batch operations keep running without impact when an unexpected failure occurs.

Helps ensure safety by minimizing disruptions to critical processes. The redundant Batch Executives reside on a pair of Application Stations. One Application Station is dedicated to the active Batch Executive and the other Application Station is dedicated to the standby Batch Executive. In addition to hardware redundancy, an unexpected shutdown of the Batch Executive software or of an individual batch will also result in a switchover of the Batch Executive to ensure that disruptions to your critical processes are minimized so that your plant can continue to safely run.

Redundant Campaign Manager mitigates potential risk to operations management and business planning systems. For systems using the Campaign Manager, DeltaV Batch Redundancy includes support for Campaign Manager redundancy. This mitigates risk to disrupting integrated planning and batch activities with external systems like Syncade™ Smart Operations suite.

Automatic switchover. If the active Batch Executive or its associated Application Station detects a failure, the standby Batch Executive assumes the active role automatically, with no user intervention required. Batch clients also automatically connect to the newly active Batch Executive. The standby Batch Executive is in "hot standby" mode, so switchover occurs quickly. Depending on the failure condition and Application Station redundancy configuration, the failed Batch Executive and Application Station will reboot and automatically assume the standby role, restoring batch redundancy with no user intervention.

Online upgradable. Since the redundant Batch Executives reside on a pair of Application Stations, they can be upgraded online. Just like the DeltaV controllers, you can upgrade the standby Batch Executive and its associated Application Station while the active maintains control of your batch operations, then manually switch over to the upgraded Application Station.

Product Description

The DeltaV Batch Executive manages everything from recipe execution to history collection. It is responsible for carrying out batch procedures, coordinating communication between phases, and allocating equipment and other resources required by a batch. In addition, it passes recipe data to phases running in the DeltaV controllers and reads back report data from the phases. The Batch Executive and Campaign Manager coordinate batch and campaign activities with operations management systems, like Syncade™ Smart Operations Management Suite.

For critical processes where you can't afford disruptions, the DeltaV system offers batch redundancy – which includes both the Batch Executive and Campaign Manager. You simply add a standby machine that operates in hot standby mode, mirroring the operation of the active batch node, including both the Batch Executive and Campaign Manager.

When a monitored fault is detected, the active batch node fails over to the standby batch node, which then assumes the active role. Batches and campaigns continue on the "new" active batch node without missing a step. Batch clients automatically connect to the "new" active batch node without the need for user intervention. A hardware alert and switchover event are generated and stored in the DeltaV Event Chronicle, providing notification to the operator. The event includes the reason for the switchover, if known. In addition, each batch on the list records a switchover event as part of its batch history.

The redundant batch nodes must reside on a pair of DeltaV Application Stations. For more information on the Application Station, refer to the Application Station product data sheet.

Batch redundancy is configured in DeltaV Explorer from the Application Station Properties dialog. Then, during DeltaV workstation configuration, you identify the Application Station that will act as the initial active batch node and the Application Station that will act as the initial standby batch node.

When Batch Redundancy is enabled on the Redundant Application Station node, any enabled Batch Executive or Campaign Manager on that node become redundant.
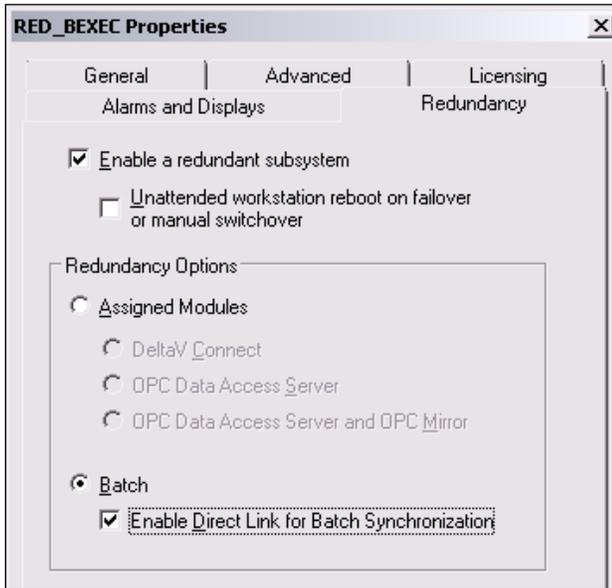
Redundancy Configuration on the Application Station Properties Dialog

When you configure the Application Station pair for the first time, you identify the initial active and the initial standby batch nodes. However, during operation, either Application Station can host the active batch node, depending on the last switchover. Since either station can be the active batch node, each Application Station should be sized to handle the active batch node role.

Although there are two physical Application Stations that host the redundant batch nodes, they are seen by the DeltaV system, including batch clients, as a single node. The Application Station pair is known by the name configured for the initial active batch node (e.g. RED_BEXEC). The initial standby batch node has the same name appended with _S (e.g. RED_BEXEC_S). The Application Station pair appears in the DeltaV Explorer system tree as a single icon.

By configuring batch redundancy, a redundancy subsystem is created on the Application Station pair. The redundancy subsystem transfers batch data between the Application Stations, keeping the two stations synchronized.

When you configure batch redundancy, the Application Station itself is not redundant, only the Batch Executive and Campaign Manager applications. In addition, the Application Station pair is dedicated to batch redundancy. Once the Application Station pair is configured for batch redundancy, except for the batch executive and campaign manager subsystems, no other subsystems on the Application Station pair may be enabled. Likewise, you are prevented from enabling batch redundancy on an Application Station pair where other subsystems are already enabled, including Assigned Modules.

The automatic Batch Executive and/or Campaign Manager switchover protects you in the event of a failure. The redundancy subsystem monitors for problems with the batch components, including the Batch Executive, Campaign Manager and any batches and campaigns on the current list. If a problem should be detected, then the entire Application Station switches to the standby batch node, with the standby batch node assuming the active role. Batch clients will automatically connect to the newly active batch node. Application Station switchover typically takes a few seconds, depending upon the Application Station hardware and size of the batch configuration.

During normal operation, the standby batch node is in "hot standby" mode, so switchover from the failed active to the standby batch node typically occurs immediately after the redundancy subsystem has detected the failure and triggered the switchover. The hot standby mode ensures immediate availability of the Batch Executive and Campaign Manager and bumpless control of your batches after switchover.

Options

Direct link for batch synchronization. Physically, the active and standby batch nodes are connected to the DeltaV control network for normal communications. There can be a significant amount of data to be synchronized between the active and standby nodes in batch operations. Therefore, it is recommended that you enable the "Direct Link" for batch synchronization when enabling batch redundancy. The "Direct Link" is a dedicated direct connection and provides an optimized pathway for synchronizing batch data. The DeltaV control network acts as the backup to the Direct Link connection.

When this option is enabled, the network card used for this connection is selected during workstation configuration. Its status can be monitored in DeltaV diagnostics. When the Direct Link is not used, synchronization of the active and standby pair occurs via the DeltaV control network.

Hold any running batches on switchover. The default behavior on a switchover is for batches to continue in the state they were in prior to the switchover. An option is provided on the Batch Executive to send any active batches to held when a switchover occurs, in the event that you prefer to perform some investigation as to why a switchover may have occurred before your batches progress any further.

Batch Redundancy

Unattended workstation reboot on failover or manual switchover. A failed active batch node and its associated Application Station will remain failed by default, waiting for the cause of the failure to be investigated. While the failed batch node is in the failed state, switchovers are disabled and the active batch node is in simplex mode. However, you can configure the Application Station pair to automatically reboot the failed Application Station to allow the failed batch node to assume the standby role without user interaction, if possible. A standby batch node that assumes the active role will remain the active batch node until the next switchover.

Some of the events that can cause a switchover are:

- Batch Executive failure

- Campaign Manager failure

- Power failure

- Unexpected termination or loss of communication with an individual batch

- Application Station hardware failures

- Manual switchover from Diagnostics
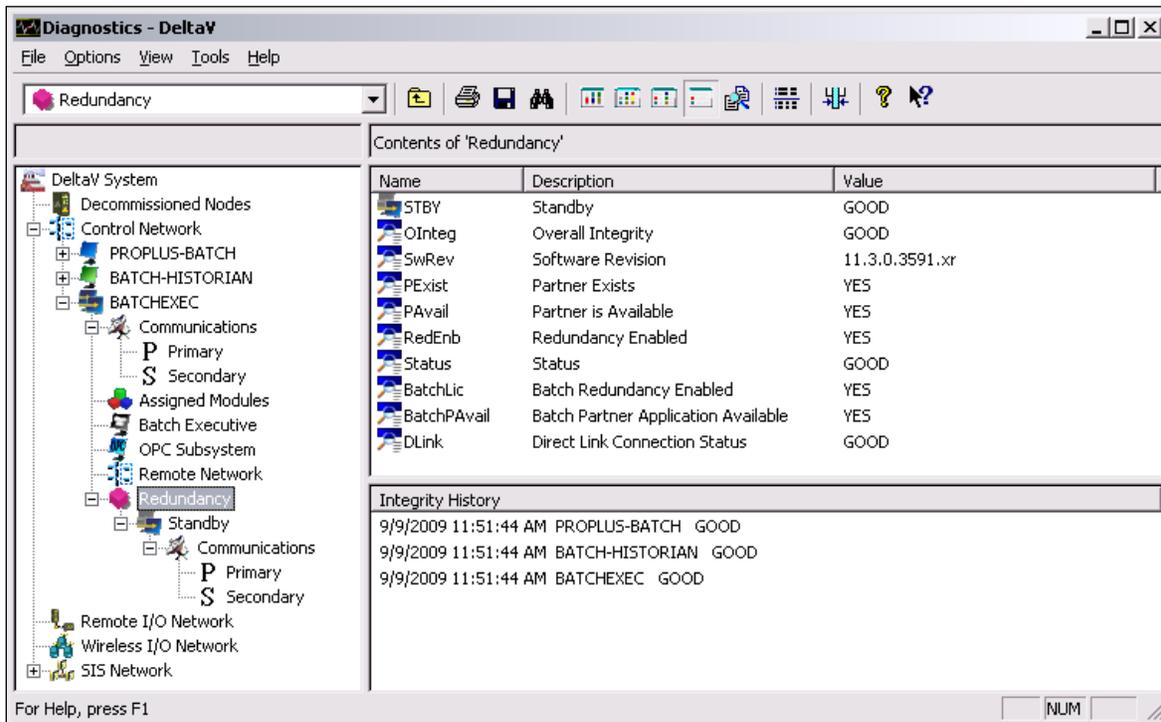
Diagnostics

The DeltaV Diagnostics Explorer application shows the status of the redundant batch nodes, the Application Station pair, and the redundancy subsystem, including the Direct Link when enabled, as shown below.

Like other redundant DeltaV applications, a manual switchover is performed from the Diagnostics application. Only users with the Diagnostics Switchover privileges in DeltaV Security are able to perform a manual switchover.

From DeltaV Diagnostics you can see the status of the active and standby batch nodes. Indication of the active and standby batch node status is also available from a redundancy status faceplate display located in the system tray on the Application Station pair.

Redundancy Status Faceplate Display

DeltaV Diagnostics allows you to view DeltaV Batch redundancy diagnostics data.

Online Upgrades

Online upgrades are supported for systems with batch redundancy. You can upgrade your active and standby batch nodes without losing batch data. Simply upgrade the standby batch node, and then perform a manual switchover. When the switchover is complete you can upgrade the other batch node in the redundant pair.

As with any system upgrade, you should review the product documentation and consult with your local support organization for the exact steps to follow in upgrading your DeltaV system.

System Compatibility

Each v11.3 or greater DeltaV system will support up to 4 redundant Batch Executive nodes and up to 4 redundant Campaign Manager nodes.

The following configurations are supported for the Campaign Managers in a redundant Batch system.

■ **Redundant Batch Executive and Redundant Campaign Manager on Same Application Station Pair.** Whenever the Batch Executive and Campaign Manager are enabled on one Application Station pair, then the redundant Campaign Manager must connect to the redundant Batch Executive that is on the same Application Station pair.

■ **Simplex Campaign Manager.** A simplex Campaign Manager can connect to either a redundant or simplex Batch Executive. However, the simplex Campaign Manager cannot be enabled on the Application Station where the redundant Batch Executive is enabled.

■ **Redundant Campaign Manager.** The redundant Campaign Manager can connect to any Batch Executive, either redundant or simplex. However, if there is a redundant Batch Executive on the same Application Station pair as the redundant Campaign Manager, then the redundant Campaign Manager must connect to that redundant Batch Executive (the one running on the same Application Station pair).

Ordering Information

Description	Model Number
Batch Redundancy	VE2238RED

The batch redundancy license is a node based license. As such, the pair of Application Stations that comprise a redundant batch node share one batch redundancy license.

Related Products

■ **Advanced Unit Management Software.** Provides class-based Unit Modules and aliasing to make developing unit-relative equipment strategies simple.

■ **Batch Executive.** The batch engine which coordinates all batch processing activity, creates detailed batch history records and schedules recipes and resources.

■ **Batch Historian.** Automatically collects and stores batch recipe execution data from the DeltaV Batch Executive and process alarm and event data from the DeltaV Event Chronicle.

■ **Campaign Manager.** Creates and manages a campaign by specifying the recipe, formula, equipment, and number of batches that are to be run within the campaign. A Service-Oriented Architecture Web Service is available to enable production-scheduling packages to initiate the creation of campaigns in the DeltaV system.

■ **DeltaV Operate.** High performance operator graphics, trends and alarms offered in standard operating layouts and utilizing system-wide built-in security.

■ **DeltaV Operate for Batch.** Batch Controls allow you to operate your batches from the same DeltaV Operate environment used to monitor and control your process.

■ **Recipe Exchange.** Provides an open, programmatic interface to the DeltaV recipe management system. Recipe Exchange is based on an XML schema that provides the ability to programmatically import and export DeltaV recipes. A Service-Oriented Architecture Web Service is also available for Recipe Exchange.

■ **Recipe Studio.** Powerful yet simple to use application for graphically configuring recipes (with formulas) for successful batch production.

■ **Syncade™ Smart Operations Management Suite.** A new class of real-time production management software, provides an easy, flexible, integrated solution that increases plant performance by efficiently managing plant materials and equipment, coordinating production operations, improving quality operations and integrating plant information.

Prerequisites

■ One ProfessionalPLUS Station in a DeltaV system.

■ One Application Station Software Suite license with the appropriately sized Basic, Advanced or Professional Batch license. This license is shared by the pair of machines comprising the redundant batch node.

■ Two Dell computers (workstation or server class, as required).

■ It is recommended that the Dell computers used for the Application Station pair be the same model.

■ The Application Station pair used for batch redundancy must be dedicated to batch communications; you cannot enable any other subsystems on the Application Station pair.

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