

PHARMACEUTICAL AND CHEMICAL



A Truly Batch-Ready System with a Fail-Safe Backup Plan

Creating and implementing a batch system that operators can run manually if the batch system is unavailable

Background

A company wanted to develop a DeltaV system capable of full batch processing, but have the system be capable of running phases manually if the DeltaV Batch System was unavailable. The company was replacing an existing batch system and had additional requirements that the system change should be transparent to the operator. These two requirements prevented an installation using conventional batch configuration techniques. These requirements were requested to eliminate risks from either a batch system failure or operator errors caused by operating a new system.

The proposed DeltaV system would incorporate the basic concepts of the S88 standard for batch process control. Because S88 provides a consistent set of standards and terminology for batch control and defines the implementation of the physical model and procedural model, it helps system designers create a universal model for batch control. In this case, a strict adherence to S88 would not provide the functionality that the customer required. The requirements of this implementation were that operators have the ability to run process phases independent of the unit.

S88 and batch control encompass layers of programming, beginning with continuous control and then moving on to procedural control:

- Control modules
- Equipment modules
- Phases
- Operations
- Unit procedures
- Procedures

In DeltaV, the Batch Executive controls the procedural layer (Procedures, Unit Procedures, and Operations), and handles all recipe management, arbitration, and sequential management. The continuous logic (Control Modules, Equipment Modules, and Phases) are executed at the controller layer.

The company chose to work with Avid Solutions because of the company's firsthand plant floor experience, extensive process industry knowledge, and ability to solve complex systems challenges by being creative. Avid Solutions has a proven history of providing visibility across manufacturing business processes and plant floor operations to improve OEE, increase agility and reduce time-to-market.

Approach

Because the DeltaV Batch Executive is a software application that runs on a peripheral server, it is prone to corruption, hardware failure, and system failure. Avid Solutions was asked to develop and program a system that included all programming levels, but allowed for manual control of the physical DeltaV control functions in the event the batch executive failed. The configuration was developed such that it could fit into the graphic and operator interface standards established at the site.

System

To design a system that would allow for manual operation if the DeltaV Batch Executor failed, the Avid Solutions team moved configuration typically found in a DeltaV phase to the equipment module level. This provided the ability to individually start and stop the equipment modules without having to start a phase. Not only did this change help accomplish the goal at hand, it also fit in with how the client's system already worked. Avid Solutions developers then created custom logic to manage the communication between the DeltaV Equipment Module layers and the DeltaV Batch Layer for failure propagation, as failure propagation would not be typically available if the batch executive failed.

Now, the operator retains the ability set recipe parameters at the equipment level in the event of a batch system failure, giving him more control over the system. Alternatively, if the batch executive is running, default recipe parameters are enforced providing consistent quality. The operator interface has been designed such that the operator can seamlessly alternate between running with the batch system or without the batch system if required. The end result is that the system is set up for the best results possible in either situation. This type of flexibility is particularly helpful in chemical applications where the ability to react to unforeseen circumstances is critical.

Applications:

Batch Processing

Technology:

DeltaV

S88

"We approached Avid Solutions with a uniquely difficult task of creating a fully batch-ready system with all of the benefits of batch processing that could also be manually operated, if needed. Their manufacturing floor and processing experience led them to deliver exactly what we needed."

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System (Continued)

Avid Solutions' experience spans manual systems, batch systems with manual backup, and completely automated system with a redundant batch executive to manage redundancy - completely automated systems can maximize the S88 standard to control much of the system through the phase and module levels rather than equipment level, which saves overall time.

Results

Successful batch control implementations allow companies to optimize batch timing and run multiple batches simultaneously. With batch processing solutions, companies gain quality standardization and optimize overall equipment. They're able to increase throughput, reduce risk of cross contamination, and reduce risk of human error because the automated system takes the place of operator decisions. Systems can be validated and guaranteed to run the same way every time and presenting failure notifications when needed, giving greater assurance to adhere to standards set by regulatory organizations like the FDA. In some cases, this reliance upon the automated batch can increase reaction time, which increases risk. The solution implemented here combines the advantages of a full batch system with the flexibility required to adequately react to adverse conditions.

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