

Das DeltaV System



Contents



The DeltaV system makes advanced control not only easy, but it's also fun to use. Duncan, the DeltaV spokesperson, is shown here representing the comprehensive suite of DeltaV advanced control products. Look for Duncan throughout this brochure and in our software.

1 Introduction

The DeltaV system delivers precision control for better plant performance—easy.

2 Advanced Control

Embedded, easy-to-use, sophisticated advanced control.

4 DeltaV Inspect

Provides key plant metrics for at-a-glance performance and abnormal condition monitoring.



6 DeltaV Tune

Makes loop tuning easy—whether it's PID or fuzzy logic control.



8 DeltaV Fuzzy

Provides improvement over classic PID control for those tough applications.



10 DeltaV Predict

Gives you state-of-the-art constrained multivariable model predictive control to tackle the most difficult control problems—easy.



12 DeltaV Neural

Provides accurate virtual sensors based on neural net technology.



14 DeltaV Simulation Suite

Provides a complete engineering and operating environment, plus virtual controller to develop and test control strategies on a PC.



16 DeltaV Simulation Suite - Professional

Add Simulate Pro for more power and advanced functionality such as global enable/disable of simulation and faster/slower than real-time execution of control and logic.

17 DeltaV Simulation Suite - Multinode

For multiple user offline development or full scale operator training systems, use Simulate Multinode.

18 DeltaV Simulation Suite - mimic

A complete process modeling package that interfaces with the DeltaV system or with DeltaV Simulate.

20 HYSYS.Plant

State-of-the-art dynamic simulation technology that helps you design, manage and operate processes efficiently and effectively.

20 HYSYS Operator Training System (HYSYS OTS+)

Enables you to effectively use HYSYS process simulation in the DeltaV system for operator training.

21 Real Time Optimization (RTO+)

Model-based performance monitoring and optimization application that helps you make informed, up-to-date decisions.

21 Multivariate Statistical Process Control (MSPC+)

Provides online process performance monitoring of continuous, batch and semi-batch processes.

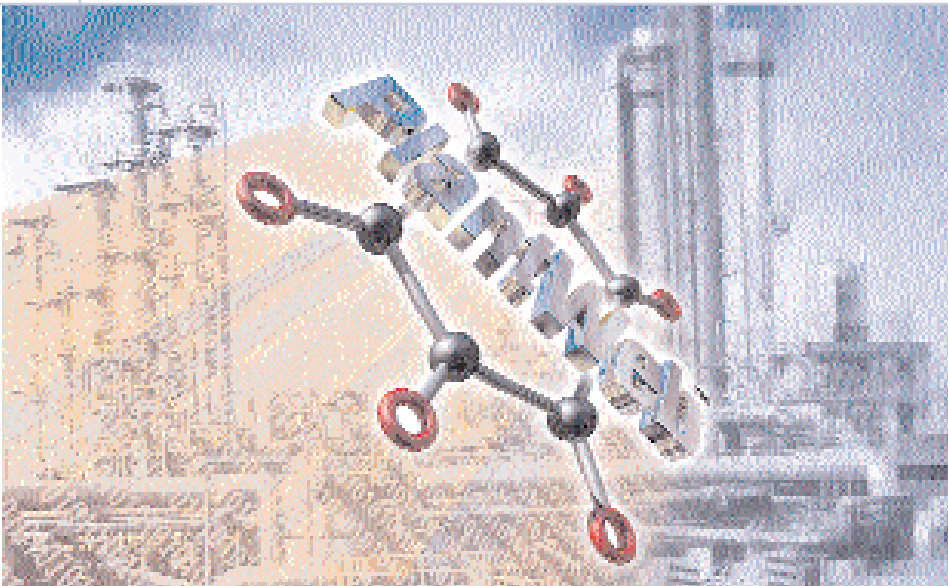
22 e-fficiency

Maximize efficiency and minimize shutdowns. A web-based equipment performance monitoring solution.

24 Emerson Can Help

We have the people and expertise help you achieve operational efficiency with precision control.

Precision Control—Easy



Introduction

Better operational efficiency through precision control is key to profitably meeting your customers' expectations and staying ahead of your competitors.

Better plant performance—made easy

The PlantWeb® architecture and its key component, the DeltaV™ digital automation system, provide a solid foundation for delivering revolutionary results by combining the intelligence of digital field devices, the DeltaV system, and integrated asset management.

This foundation delivers precise regulatory control and optimizes your plant assets.

Improve your plant performance at all stages: from planning and design, to implementation and startup, through operations, optimization, and maintenance, to evolution of control strategies and systems.

Studies show that nearly 40% of all process loops are under-performing. Less than 1% of these loops are being addressed with traditional advanced control technologies.

This opportunity for improvement is where DeltaV advanced control fits.



DeltaV advanced control provides the full array of applications including automatic variability inspection, tuning, fuzzy logic control, model predictive control, simulation, and optimization. And its easy enough for the typical process engineer, not highly skilled, expensive specialists to use.

The result:

- quicker return on investment
- reduced process variability
- increased product quality
- lower costs.

And, best of all, DeltaV advanced control makes it easy.

Advanced Control

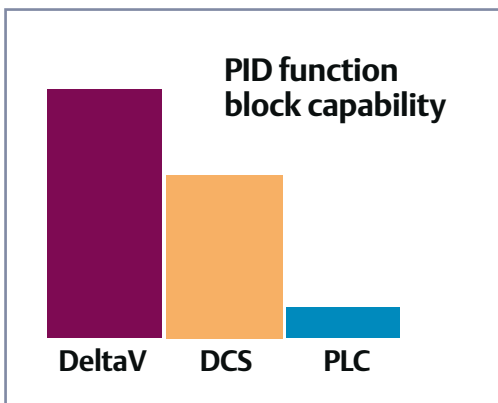


Precision control is delivered from an array of advanced control solutions including variability inspection, tuning, fuzzy logic, model predictive control, simulation, and optimization.

Built on a solid foundation

A profitable, efficient operation begins with a solid foundation. The PlantWeb architecture is a foundation to deliver predictive information from intelligent field devices to avoid unexpected shutdowns, excessive variability and pinpointing trouble areas for quick resolutions.

Only the DeltaV system is built to accept this wealth of field intelligence and deliver it where it's



The DeltaV system outperforms all others—even for basic PID control.

needed. That means more robust, precise control that can adapt to the changing conditions of your process. Without this solid foundation, extra time and energy are required to maintain operations.

Easy to use

Given today's smaller, more hurried plant staffs, DeltaV advanced control applications are built as part of the same, easy to learn and use environment as standard regulatory control. Fuzzy logic control drags and drops just like a standard PID block. Even for basic PID functionality, the DeltaV system has more capability than distributed control systems and many times more capability than a PLC.

Implementing traditional advanced control solutions on DCS or PLC systems required large up-front software and services investments. Maintaining the solution required expensive expertise every time plant conditions changed.

Given the high cost, these traditional solutions could be used only in a few, high-return applications.

The embedded DeltaV advanced control applications are designed for the typical process engineer to use on a much broader array of control challenges.

Each connection is a data pipe, providing data and status to prevent controlling on bad data.



Embedded, easy-to-use, sophisticated advanced control.

Reliable, validated data

Data received from intelligent field devices, like Emerson's FOUNDATION™ fieldbus and HART® devices, provide the quality of the data to the DeltaV system. This assures that the regulatory and advanced control algorithms are working with good data and can take corrective action in the case of questionable or bad data.

The result is more precise control and efficient operations.

In the following pages, see the value the entire array of advanced control solutions can apply to your operation.

Get embedded, easy-to-use, sophisticated advanced control.

Location-independent design with consistent use of standard parameters throughout for easy, flexible engineering.

Standard FOUNDATION fieldbus modes supported by every control and I/O block simplifies engineering.



The DeltaV system's intelligent architecture provides the ideal foundation for changing your plant performance.

Digital.
Smart.
Here to stay.



“For the first time in my 32-year career, all the elements of advanced control have come together easily in one place—DeltaV. Automatic loop tuning and performance analysis, model predictive control, intelligent sensors, dynamic simulation, operator and engineer training, and real time optimization—all from my laptop.”

—Greg McMillan
Solutia Inc.
USA

DeltaV Inspect

Eliminate time spent chasing problems by having them find you.

Automatic loop performance monitoring

DeltaV Inspect is an advanced process monitoring application that instantly identifies high process variability and under-performing control loops. Inspect quickly and easily keeps you informed of the health of your process and control strategies without any need for configuration or setup. This functionality, combined with an easy-to-use operator interface, ensures a finely tuned process that produces quality, on-time products.



Easy to use

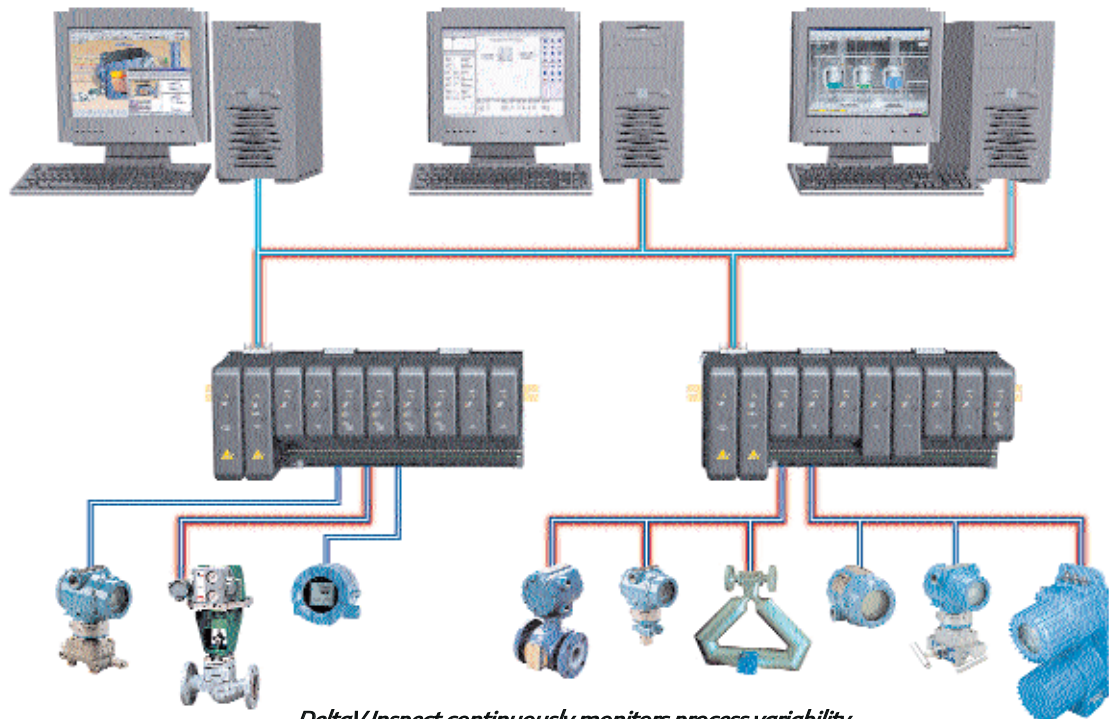
With DeltaV Inspect, there is no setup or configuration required. It's ready to start inspecting when you are.

Inspect also automatically recognizes control blocks as they are added to or deleted as control requirements change.

Using the filter and sorting capability of Inspect, you can easily focus on the control modules that may be causing variability and affecting plant performance. By quickly identifying under-performing loops and taking corrective action, you can reduce process variability and increase the efficiency of your operation.

Broad range of inspection

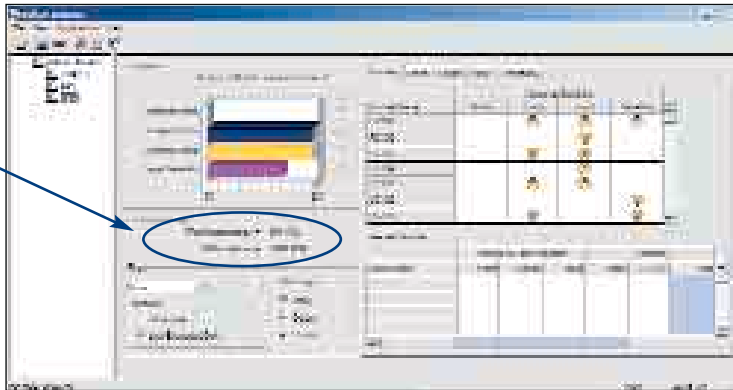
DeltaV Inspect continuously monitors for incorrect modes, limited control conditions and bad or uncertain inputs. It automatically identifies these abnormal conditions and graphically displays them on a DeltaV workstation. The percentage of time that these conditions exist over an hour, shift, or day is computed for every block and then compared to a configured global limit for each condition.



DeltaV Inspect continuously monitors process variability and control loop performance.

Optimize your plant—easy.

Key performance indices give you an indicator of your plant's performance at a glance.



When one of these limits is exceeded, the associated module will be included in the Abnormal Conditions summary.

DeltaV Inspect:

- Identifies abnormal conditions in the field
- Requires no configuration
- Allows plant-wide and remote access
- Monitors control modules as they are added, automatically.

In addition to monitoring for incorrect modes, limited control conditions, and bad or uncertain inputs, Inspect continuously monitors process variability and control loop performance. The DeltaV input/output and control function blocks automatically calculate both total standard deviation and capability standard deviation with no configuration required. The total standard deviation provides a continuous measurement of process variability.

Inspect uses a Variability Index to monitor control loop performance in addition to process variability. The Variability Index, calculated from total standard deviation and capability standard deviation, provides a quantitative measure of how much variability could be reduced with optimum control loop performance.

Inspect provides plant-wide control performance and control utilization indices. The performance index provides a measure of overall loop performance. The control utilization index provides a measure of how frequently control loops are operating in the correct mode.

Why let process problems hide when DeltaV Inspect can automatically seek them out for you?

Focuses on main causes of lowered control performance.



“The objective of 95% of control applications is high quality and uniform products. One of the key factors is the performance of control loops, which is known to decay with time.”

—Bill Bialkowski,
Entech
USA

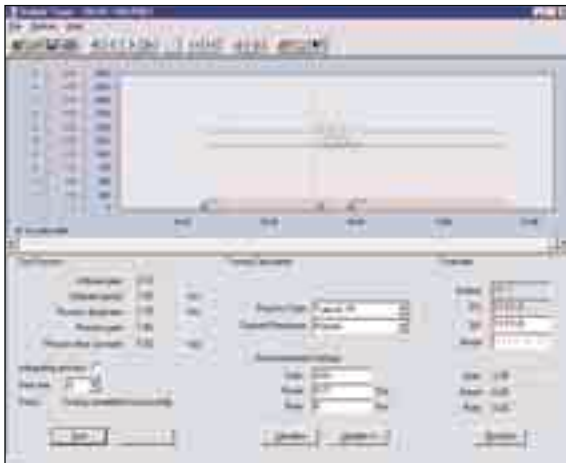
DeltaV Tune



Poorly tuned loops mean lower quality, lost production, reduced profits, and potentially costly environmental and safety issues. DeltaV Tune delivers an easy-to-use, yet powerful tuning solution.

Loop tuning made easy

Using DeltaV Tune, no special control knowledge is required to tune a control loop for optimum operation. No longer must you rely on tuning experts to keep your facility running at peak efficiency. Operators, engineers, and maintenance technicians will all find DeltaV Tune easy to learn and use.



DeltaV Tune's intuitive, easy-to-use interface makes tuning simple.

Wide variety of applications

DeltaV Tune uses patented relay oscillation principles to measure the process dynamics. This technique minimizes the process disturbance and reduces tuning time. Once process dynamic characteristics have been established, you can choose from a list of process types such as flow, temperature, etc. that DeltaV Tune will use to calculate tuning constants.

DeltaV Tune works equally well with fast or slow processes, self-regulating or integrating processes, and loops with dead time or a noisy input signal. PID and fuzzy logic control loops with process dynamics

ranging from fast to moderately slow can be quickly tuned in seconds.

This can result in faster startups and swifter response to changing loop requirements. And because DeltaV Tune is immune to a significant level of noise and process load disturbances, you can tune the most difficult loops with confidence.



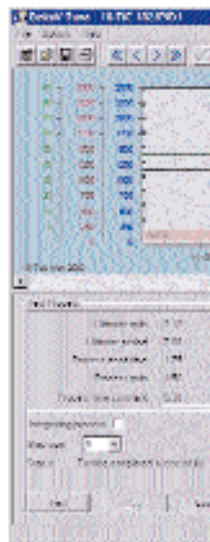
Power for advanced users

You can take advantage of the Expert tuning option and use alternative tuning rules such as:

- Modified Ziegler Nichols
- Lambda
- Lambda-Averaging Level
- Lambda-Smith Predictor
- Internal Model Control.

In addition, experienced users can analyze loop stability and examine simulated loop responses to set point changes and load disturbances.

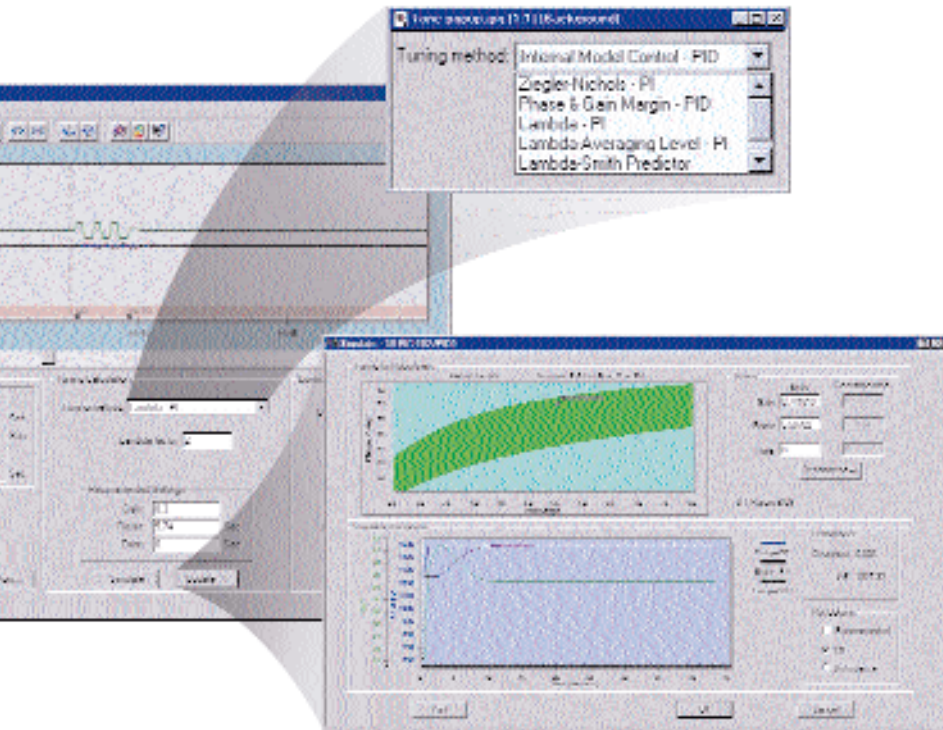
DeltaV Tune also provides sophisticated but easy to use loop simulation and analysis views that allow control loop performance to be predicted before the new tuning is used.



Tune your most difficult loops with confidence and ease.

You can view a simulated loop response based on the recommended tuning parameters, and can even compare the response with the current tuning parameters. You can also assess loop stability with a robustness plot and easily see the impact of different loop tuning parameters.

The tuning results, including the calculated process dynamics and the tuning method, can be saved to a file for future reference. This also provides a way for you to store and recall different tuning constants for different process conditions or products.



Don't let DeltaV Tune's ease-of-use fool you. Its superior power delivers advanced tuning algorithms, simulation and region of stability plots.

Optimize your process and increase quality, production, and profits.

"The CAC Monsanto plant in Muscatine, Iowa was successful in improving loop performance with significantly reduced effort compared to any alternative tuning methods."

—Ken Meyer,
Monsanto
USA

DeltaV Fuzzy



Fuzzy Logic control so smart, it's simple

PID has traditionally been the workhorse of the process industries. It's easy to implement and it's robust. Now, DeltaV Fuzzy allows faster response to set point changes or load disturbances without overshoot. On many loops, the patented algorithm provides superior performance versus traditional PID control. Tests have shown loop performance improvement of 30-40% over traditional PID.



Process loops that exhibit non-linear control are excellent candidates for fuzzy logic control. Since fuzzy logic provides fast response times with virtually no overshoot, it's excellent for loops that experience frequent set point changes or load disturbances. For example, in temperature and composition loops where overshoot can ruin the product, fuzzy logic's response curve provides better control.

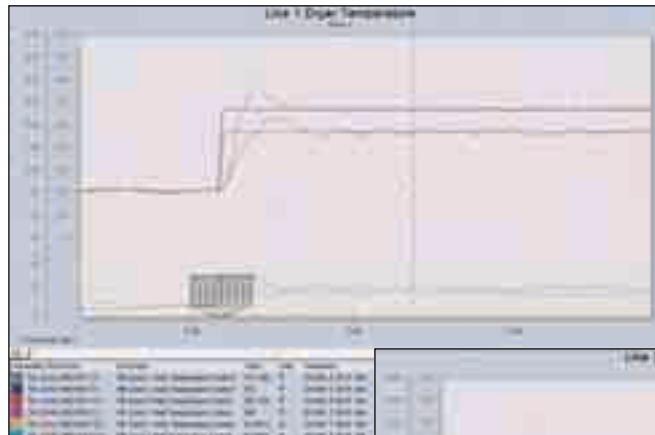
In addition, loops with noisy process signals have better stability and tighter control when fuzzy logic control is applied.

DeltaV Fuzzy is:

- As easy to use and configure as PID
 - Superior to PID control for set point and load changes
 - Highly tolerant of noisy signals and non-linear processes
 - Included in every DeltaV system.
- But not all fuzzy logic is created equal. The big difference between

DeltaV Fuzzy and traditional fuzzy loops is that you don't have to learn the fundamentals of fuzzy mathematics to do control.

The DeltaV fuzzy logic control function block uses easy-to-understand scaling factors for tuning. Plus, the algorithm manages all the rules implementation for you. In addition, unlike traditional fuzzy controllers, DeltaV Fuzzy can be commissioned and tuned using the DeltaV Tune product.



Fuzzy logic outperforms traditional PID loops for set point and load distributions on a carpet drying application. (Screen captures courtesy of the Dixie Group.)

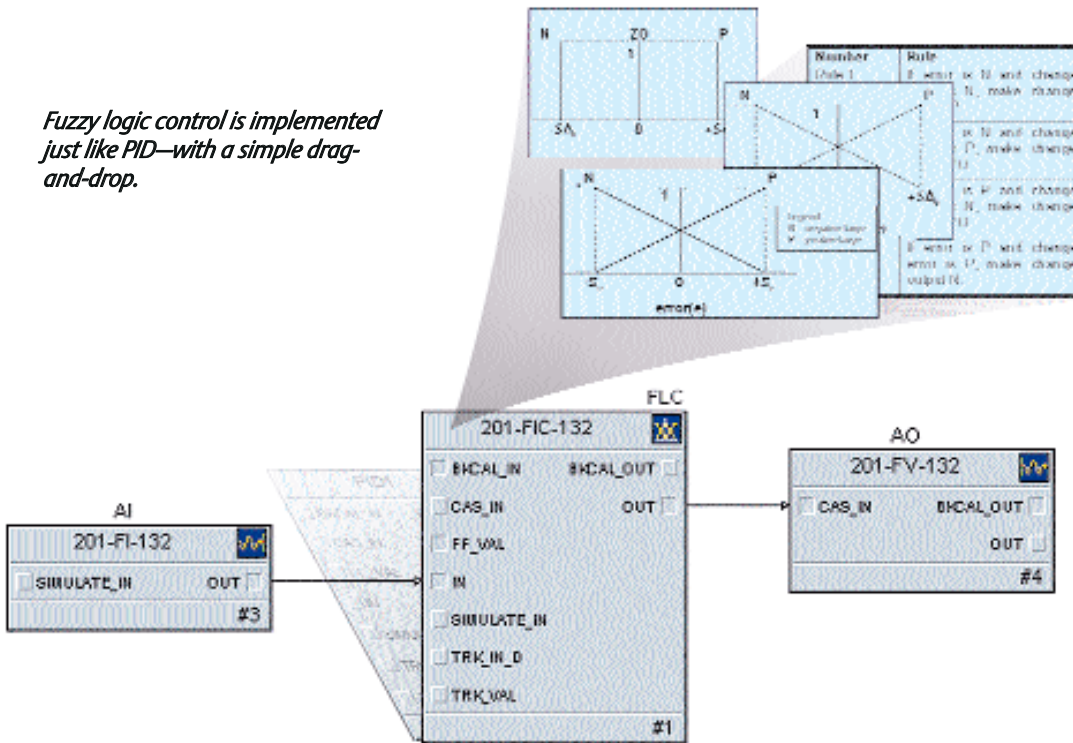


DeltaV Fuzzy is easy to use, easy to tune.



Better than PID
for many
applications.

Fuzzy logic control is implemented just like PID—with a simple drag-and-drop.



“We are now able to process different products sequentially because we know the dryer will respond fast enough to the new settings using DeltaV Fuzzy. We have increased throughput, eliminated off-quality and damaged products, and reduced reprocessing.”

—Francisco Campa
The Dixie Group
USA

DeltaV Fuzzy offers a practical, field-proven substitute for PID control. It's robust, easy to implement, and provides superior performance over PID in many cases. DeltaV Fuzzy is even capable of handling loops where manual control was once the only option.

All this makes implementing and maintaining fuzzy logic control loops very easy, even for first-time users.

DeltaV Predict



Model predictive control that's easy and accessible

DeltaV Predict offers you an entirely new approach to the implementation of constrained multivariable model predictive control. DeltaV Predict's capabilities easily address process interactions and difficult dynamics. Since these model predictive control algorithms run in the DeltaV controller, your critical strategies run in a high-speed, rugged, optionally redundant environment.



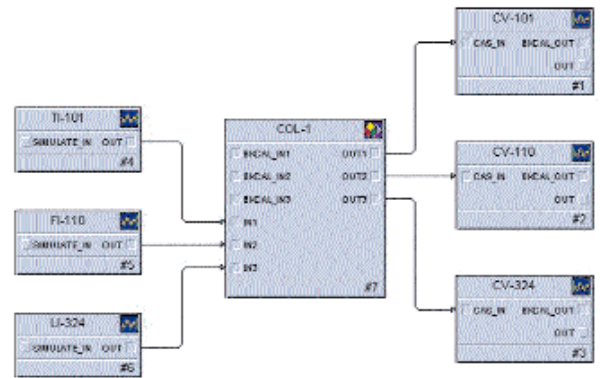
And best of all, DeltaV Predict is easy for a typical control engineer to implement—without the aid of costly

outside experts. Custom operator displays are automatically created with a single mouse click.

Using DeltaV Predict, process variability may be reduced and the process throughput automatically adjusted to maintain the process at its operating constraints. As process conditions change, DeltaV Predict automatically adapts to allow maximum throughput without violating any operating constraints.

With model predictive control, managing units involving process interaction and multiple operating constraints, control is easier than with the traditional, complex PID control strategies. DeltaV Predict fully automates testing of the process used to establish the process model. And on fast-responding

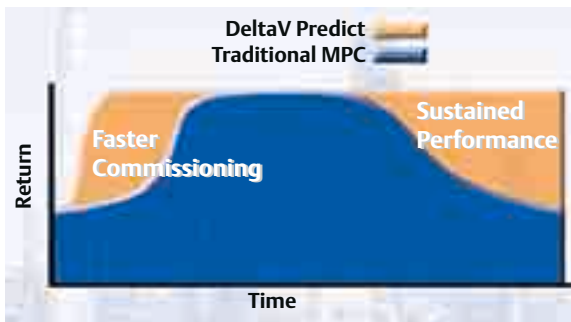
processes, controller generation may be done in a matter of seconds, versus the hours or days required with traditional techniques for multivariable control.



Model Predictive Control is implemented as a function block; making deployment fast and easy.

Using a built-in simulation environment, you can examine the control response before installing DeltaV Predict on your process. You can also observe the control response to set point changes and process load disturbances. And, you can use DeltaV Predict to train your operators before commissioning. DeltaV Predict provides:

- Reduced process variability
- Greater throughput
- Easier implementation
- Fully automated model development
- Standard constraint handling
- An embedded simulation environment.

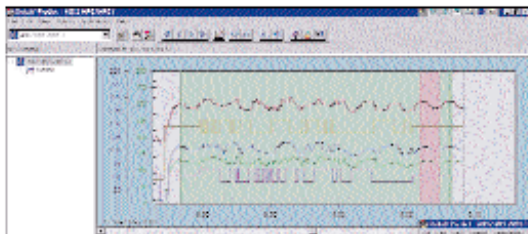


With DeltaV Predict, faster commissioning and improved sustained performance mean real savings.

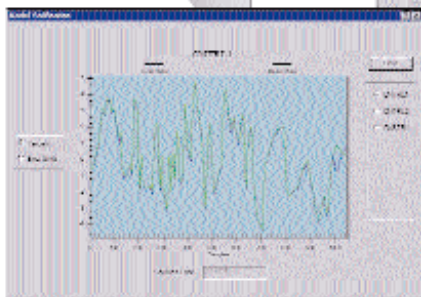
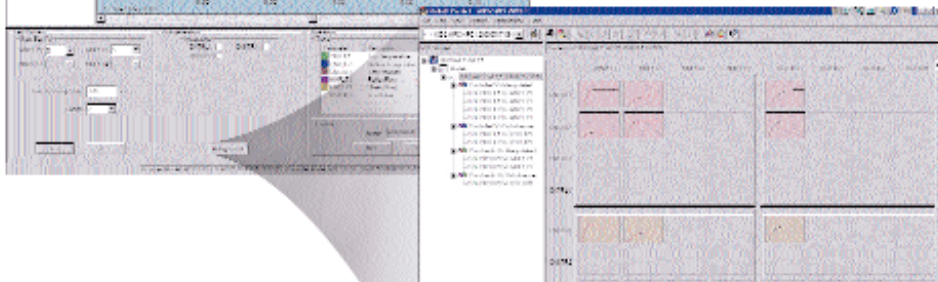
Improved, sustained performance means real savings.



Maximum throughput without violating operating constraints.

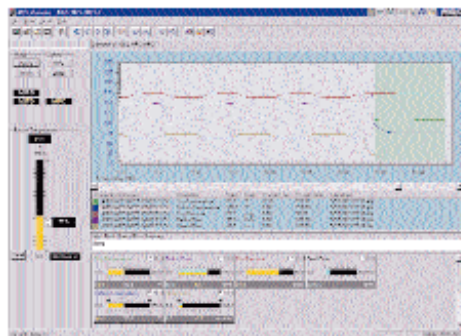


DeltaV Predict automates testing to determine the process model.



Verify overall model fit.

Analyze and modify process responses.



Pre-defined graphic components for fully automatic creation of operator interfaces are standard.

“The robustness of the control exceeds all expectations. The system even seems to perform optimally when burning four different fuels concurrently. To date we are achieving near 100% control program uptime.”

— Dave Sordi
Canfor Corp.
Canada

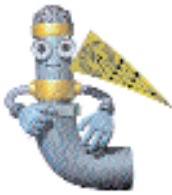
Unlike many traditional MPC products, DeltaV Predict is designed to allow control to continue, even when the process gain and dynamics change.

By providing this robustness in the control design, the need to periodically re-commission control is minimized or entirely eliminated.

DeltaV Neural



DeltaV Neural, gives you a practical way to create virtual sensors for measurements previously available only through lab analysis. It can also be used to augment onstream analytical devices or replace them where they are not practical.



controller to give continuous indication of the predicted quality as fast as once every second.

The DeltaV controller provides your virtual sensor a high-speed, rugged, and optionally redundant control environment, ideally suited for your most demanding applications.

Accurately estimates quality parameters

One of the greatest challenges in process control is getting timely data on hard-to-measure variables. Generally, this includes variables related to quality or environmental aspects of production. These variables are often obtained by periodically gathering product samples and analyzing them offline in a laboratory.

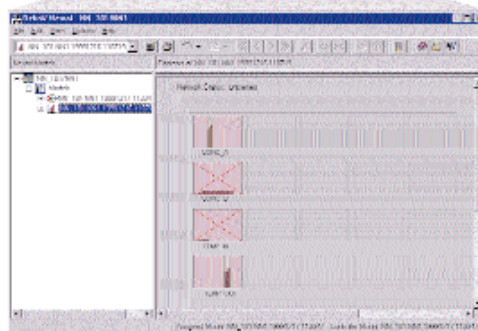
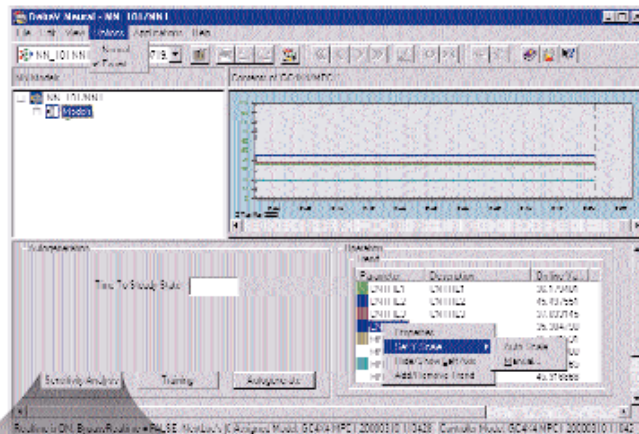
Easy to use

DeltaV Neural automatically uses the historical data provided from the DeltaV system's embedded historian. You can quickly and easily train the neural network and verify the accuracy of the resulting model.

Like the rest of the DeltaV system's intuitive, easy-to-use environment, DeltaV Neural blocks are available to drag and drop from the Control Studio palette.

Rock solid, controller-based execution

Once the neural network is trained and tested, it's executed in a function block in the DeltaV



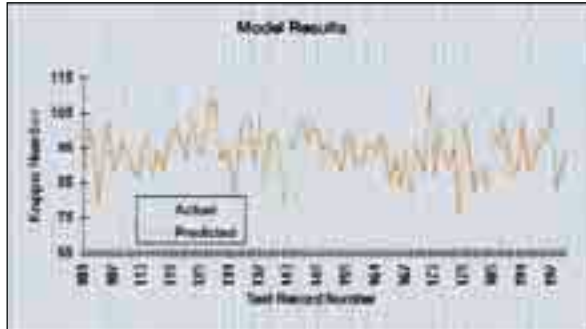
Graphical display makes it easy to visualize impact of inputs on quality parameters.

Estimate quality parameters on-line with virtual sensors—accurately and easily.

But by the time you get the results, it might be too late to make control adjustments.

Neural network technology has been used to predict key quality variables such as octane numbers, NOX emissions, melt index and other quality parameters. Through neural network models based on historical process measurements, you can predict future process performance quickly. In addition, the non-linear nature of neural network models can sometimes be useful in applications where first principal models give poor results. DeltaV Neural:

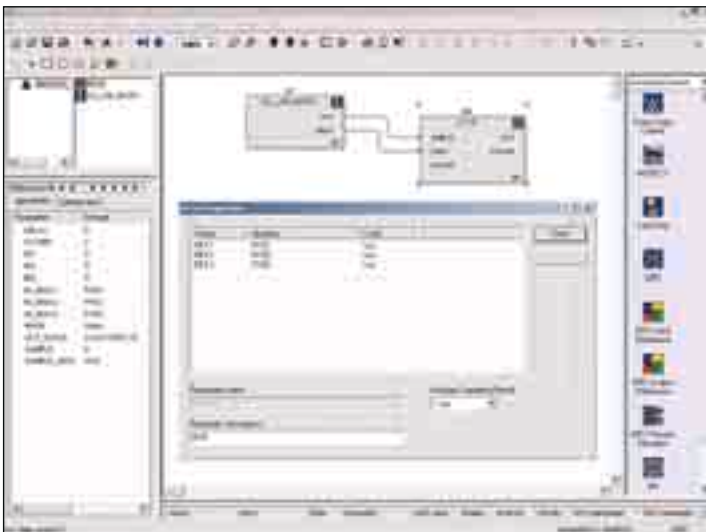
- Easily creates neural networks
- Executes neural network as a function block
- Provides automatic pre-processing, design, training, and verification
- Allows expert mode interaction in the neural network development.



Model results versus lab analysis of grab samples from continuous digester outlet.

Now you can replace and cross check physical sensors and analyzers, and have an inexpensive online predictor of lab test results.

Reduce your process variability and increase product quality, while eliminating much of the need for manual sampling with DeltaV Neural—easy.



The Neural Network function blocks capture elusive predictive quality measurements — based on upstream measurements.

Quickly train and execute your neural network.



“Using DeltaV Neural, we estimate acid specific gravity in six evaporators once per second with an average error of less than 0.25%.”

—Vince Artingstall
A Major South African
Chemical Company

DeltaV Simulation Suite

DeltaV Simulate

Imagine starting automation system design, configuration and logic checkout, and operator training long before your system hardware arrives. Now you can, with Emerson's easy DeltaV Simulate.



Notebook PC-based simulation

This industry-first innovation lets you configure an entire DeltaV system on your desktop or notebook PC without any connected hardware. DeltaV Simulate gives you the freedom to begin critical path project tasks such as configuration checkout and display building when you're ready.

With DeltaV Simulate, you can configure all supported features, including continuous, batch, and

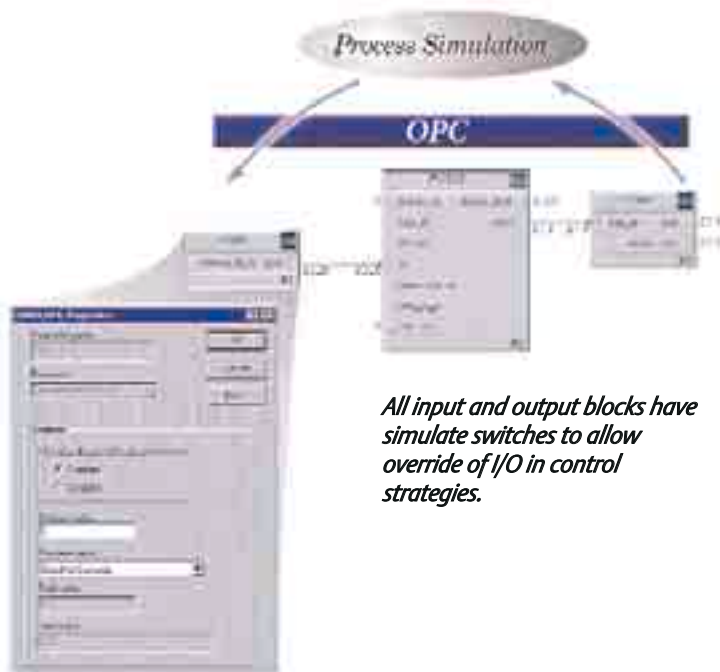
advanced control—along with the associated workstation displays, alarms and historian data, and OPC connectivity.

What's more, you can fully simulate all operator interface and selected control module execution in your PC to help with control logic checkout.

And, using the control and I/O block simulation capability of the DeltaV system, you can supply field measurement values and status to the simulation manually or by blocks used to simulate the process.

With DeltaV Simulate, you can:

- Configure an entire DeltaV system and fieldbus devices from a single PC
- Check out control logic and operator interface using simulation
- Configure and fully verify OPC interfaces to the DeltaV system
- Run with no additional DeltaV hardware, I/O, or system licenses.



All input and output blocks have simulate switches to allow override of I/O in control strategies.

Process simulation and operator training—the easy way.



DeltaV Simulate allows you to put all your control strategies, operator displays and OPC interfaces on a single PC.

Effective trainer

Using function blocks to simulate the process, you can create dynamic process simulations to support operator and engineering training. This can turn your DeltaV Simulate into an effective training solution.

No need for costly additional hardware training systems like prior automation systems required.

DeltaV Simulate provides a platform that third-party developers can use to develop and test OPC interfaces to the DeltaV system that are needed for advanced control. For more sophisticated applications, you can use OPC-compliant process simulation packages like HYSYS or mimic™ with DeltaV Simulate. This provides process and control system checkout and operator training before DeltaV hardware is installed.

Recurring benefits that really payoff.



“Solutia Inc. is dramatically reducing the overall life-cycle cost of their control systems through the ability to execute dynamic process simulations with all features of the control system on a single PC.”

— Greg McMillan
Solutia Inc.
USA

DeltaV Simulation Suite



Simulate Professional

Get the most out of your high-fidelity process simulation by controlling it with the modules that will run in your DeltaV system. DeltaV Simulate Professional is a complete environment for off-line process and control system simulation.

DeltaV Simulate Professional allows the simulated modules to be executed more quickly or slowly than real time—or stopped completely. When your process simulation can execute faster than real time, being able to match the control system execution to the simulation will cut hours off the simulation of a slow process.

The execution rate of all modules assigned to a node may be changed at any time with a single request.

Through the DeltaV Simulate Professional application, you can easily enable or disable simulation on all I/O blocks assigned to the node. Simulate status for modules within a virtual controller is indicated by the summary list shown in the upper right portion of the user interface.



Simulate Professional allows you to change controller speed and manage your simulated configuration.

DeltaV Simulate Professional also allows dynamic blocks in the modules assigned to the node to be initialized with a single request.

Parameters are included in the Application Station and the stand-alone Simulate PC to allow a simulation application to programmably enable/disable simulation, initialize dynamic blocks, and set the execution faster/slower than real time.

Simulate Professional:

- Executes DeltaV control more slower or faster than real time
- Enables with a single request I/O simulation on all blocks on a node
- Initializes with a single request all dynamic blocks on a node
- Expands virtual controller capability
- Allows process simulation applications to coordinate control simulation.

These parameters may be written by the simulation package using OPC.

Extending the capabilities of DeltaV Simulate.

DeltaV Simulate Professional can extend capabilities of a DeltaV Simulate workstation, or in the case of a Simulate Multinode system a DeltaV ProfessionalPLUS Station or Application Station. Of course, DeltaV Simulate Professional cannot be installed as part of any system connected to a live process.

Simulate Multinode

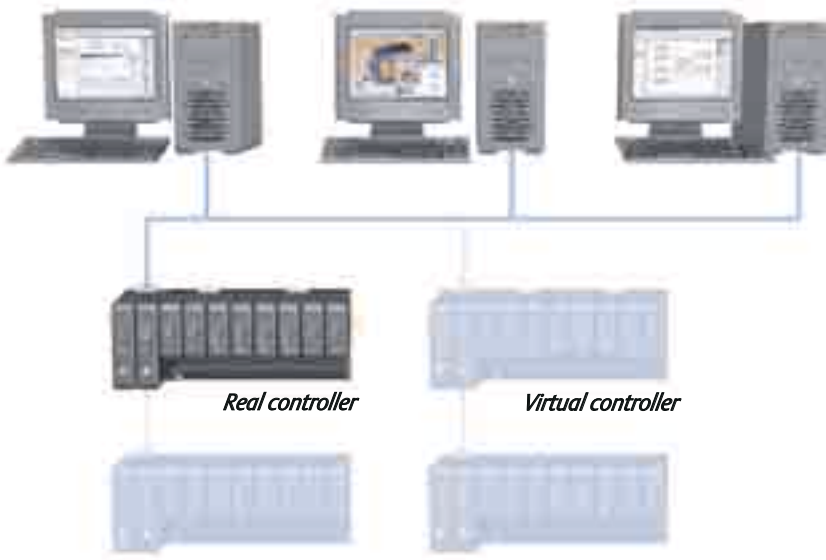
With DeltaV Simulate Multinode, Application Stations may be added to allow control execution to be distributed between it and the ProfessionalPLUS Station. Also, DeltaV Operator Stations and controllers may be added to support your training or development system requirements.

Building training systems has never been so easy. Since you can use the same configuration as the real online system does, you never have to convert, compile, or redo any configuration. All engineering configuration from the on-line system may be completely reused in the training system with zero extra effort.

It works with everything from control, to operator graphics, to OPC interface applications.

Simulate Multinode:

- Trains operators in a secure environment with the exact configuration as the online system
- Develops control strategies and tests your system in a cost-effective off-line system that mirrors your plant
- Deploys tested applications faster than ever before
- Promotes faster, safer system startups with trained staff and proven control strategies.



Simulate Multinode allows any combination of real and virtual controllers for powerful, flexible training and development systems.

Offline, faster than realtime simulation.



“The system is user friendly, there is a real integration and the rest works by itself.”

— Matias Morales
PDVSA
Venezuela

DeltaV Simulation Suite



mimic™

Use mimic to simulate the process you are controlling with the DeltaV system. mimic is a complete process-modeling application that connects with the DeltaV system or with DeltaV Simulate.

mimic lets you easily create low—and medium fidelity models of your process in realtime and test your control strategies without affecting your actual process.

Using your DeltaV configuration database as input data, mimic will automatically create simple loop and discrete control tiebacks. mimic includes all tools to import process information directly from a DeltaV system configuration. These tools reduce the time it takes to develop a simulation and increase the ability to define simple behaviors for field devices including FOUNDATION fieldbus devices.

Using your DeltaV module configuration, mimic will automatically create simple loop and discrete control tiebacks. Depending on your simulation needs, your simulation configuration could be complete.

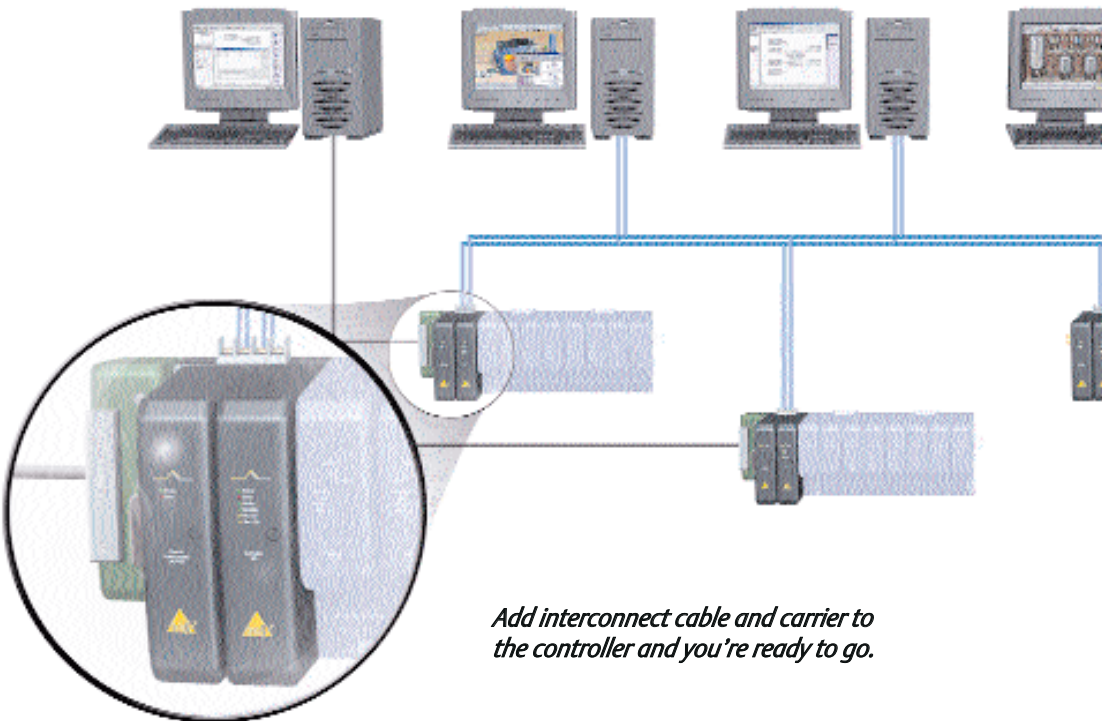
If you have more sophisticated simulation requirements, mimic offers you complete process modeling capability. You can model your process conditions to better understand the behavior of the process.

mimic hardware connection

mimic emulates the actual DeltaV I/O to simulate field device behavior and response. The I/O signals are channeled through mimic, not the real I/O.

No special controller configuration is required to use mimic because it connects directly onto the DeltaV I/O bus and looks just like DeltaV I/O to the controller.

A workstation with one or more DeltaV controller I/O cards interfaces with each controller I/O bus. One DeltaV controller I/O card is required for each controller to be simulated simultaneously.



Add interconnect cable and carrier to the controller and you're ready to go.

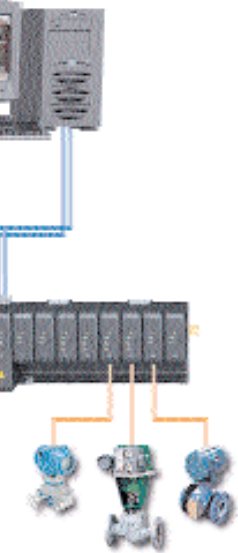
Model your process in realtime and test control strategies—easy.

mimic software connection

In the OPC version of mimic, the process simulation communicates directly with the control module running in a DeltaV Simulate environment.

mimic can be running in the same PC as DeltaV Simulate or in a separate PC connected to the Simulate PC via TCP/IP.

mimic includes configuration tools that allow process information to be imported directly from a DeltaV system configuration. These tools reduce the time it takes to develop a simulation and increase the ability to define simple behaviors for field devices.



Training and testing

The mimic Training Manager addresses many aspects of control system operation including:

- Keyboard use
- Display access
- Process/emergency procedures
- Process upsets
- Control system dynamics.

These items play a crucial role in how well control room operators perform. Simulation with mimic allows you to use the actual control system hardware and software to train operators. This builds operator confidence, resulting in faster startup and lower downtime.

The mimic Training Manager addresses process-specific simulation and a series of event scenarios tested during the training session. While the trainee uses the actual operator console as the window into the process, the trainer uses the Training Manager and a third-party graphics package to monitor the session. From this interface, the trainer can control how the process reacts, introduce failures, direct the trainee toward specific areas of the process, and monitor trainee performance in recovering from failures and process upset conditions.

For more information visit the mimic website at www.MungerPD.com.

Automatically
create simple
loop and
discrete
control tiebacks.



“The standard OPC communications protocol built into the DeltaV system will make interfaces between the various network applications seamless.”

—David Greer,

Shell Philippines Exploration B.V.

High-fidelity Simulation



HYSYS.Plant

HYSYS.Plant is the most state-of-the-art dynamic simulation technology available today. Use the high fidelity HYSYS.Plant simulation with DeltaV Simulate to easily address critical business objectives such as production levels, time to market, design quality, safety, and efficiency for even your most complex process units.

In addition, you can simulate production changes and feed changes and anticipated disturbances to determine the robustness of your process design and DeltaV control strategy.

HYSYS.Plant and the DeltaV system are connected via the standard OPC capabilities of both products. HYSYS.Plant enables you to understand the source of bottlenecks, process upsets, and

quality problems, and it helps you identify opportunities for eliminating them. You can devise improved control strategies and assess their benefits before modifying the actual process.

A comprehensive set of models for unit operations such as distillation and reaction is available. HYSYS.Plant can give you increasing levels of detail regarding equipment geometry and configuration, depending on the desired fidelity and point in the lifecycle.

Hysys.Plant:

- Screens process designs
- Validates control strategies
- Reveals the source of the process problems
- Improves process operations.

HYSYS.OTS+

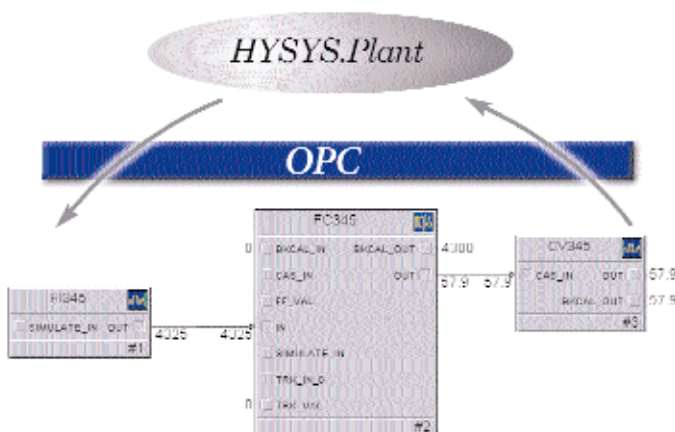
High fidelity simulation-based operator training systems provide an environment in which to improve your plant's safety, operability, and profitability.



Using the HYSYS.OTS+ real-time dynamic simulation capabilities in the DeltaV Simulate environment, your operators can practice responding to abnormal and emergency operations. HYSYS.OTS+ enables operators to design and evaluate process control strategies prior to plant commissioning.

Engineers and operators can use the rigorous dynamic model to illustrate and clarify any number of control concepts. You can run "what-if" sequences and change process control strategies to test alternative concepts. When problem areas are identified, engineering design teams can use that same model as their basis for process redesign and control strategy development.

For more on Hyprotech's HYSYS products, visit www.hyprotech.com/hysys/.



HYSYS.Plant interfaces with the DeltaV system through OPC.

Simulation-based operator training.

Optimization & Process Monitoring

RTO+ Real Time Optimization

Optimal plant performance is maintained by continuously adjusting operating conditions in reaction to variables like changing feed quality variations, product and utility prices, equipment outages, and changing ambient conditions.

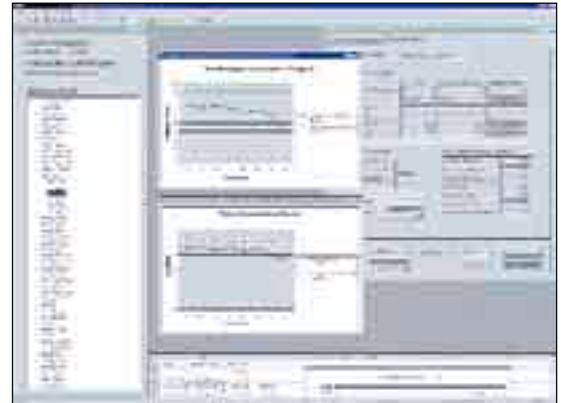
Emerson's RTO+ is a model-based, performance monitoring and optimization application designed to help you make these critical plant operation and maintenance decisions. It automatically determines the optimum operating conditions required to maximize your margins.

RTO+ is accurate and fast, but above all, it is robust (typical online times over 95%).

You can build process models, using modeling packages like HYSYS, with RTO+. You can also perform multi-time-period look-ahead optimization using varied conditions.

RTO+:

- Improves process control for large applications
- Reduces operating costs
- Improves process stability
- Reduces standard deviation
- Improves set point control
- Is running in over 400 applications around the world.



Easy graphical model and optimization setup.

For more on Emerson's RTO+, visit <http://www.mdctech.com/products/rto.htm>

MSPC+ Multivariate Statistical Process Control

Major technical challenges facing the process manufacturing industries are the need to improve production consistency and the need to provide early warning of process malfunctions. Emerson's MSPC+ is the first product specifically developed for online process performance monitoring of

continuous, batch, and semi-batch processes. It focuses on early identification of potential product quality problems.

Multivariate statistical process control (MSPC) addresses several of the fault detection limitations found in traditional univariate SPC. You can develop reference models using the DeltaV historian as data representing good or desirable production.

MSPC+ Online tracks a process moving out of control and enables you to identify the variables, or combination of variables, that are the

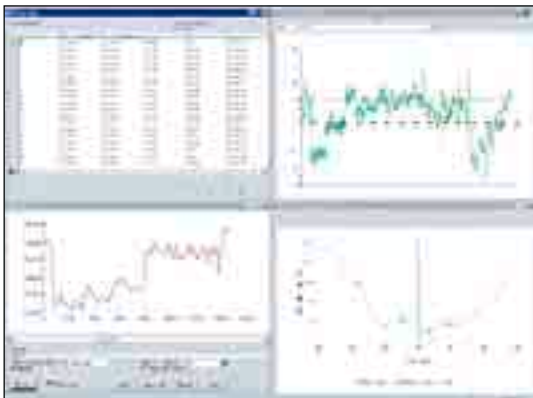
probable cause of the drift. Then, you can adjust the process to avoid continued manufacture of non-conforming product.

You can easily identify the original variables whose contribution has changed from that predicted from the nominal model with a contribution plot.

MSPC+:

- Improves process control for large applications
- Reduces operating costs
- Improves process stability
- Reduces standard deviation
- Improves set point control
- Is running in over 400 applications around the world.

For more on Emerson's MSPC+, visit www.mdctech.com/products/mspc.htm



Outline monitoring detects quality problems early.

e-fficiency



Your window to performance analysis

Emerson's e-fficiency is a web-based equipment performance monitoring service, designed to maximize utilization and minimize unscheduled shutdowns within the process manufacturing industries. This service delivers real value to your operation, by taking process data and producing validated information concerning the operating performance of plant or process equipment.

Based on rigorous model-based technology using data reconciliation, validation and parameter estimation calculations, e-fficiency provides easy and cost-effective access to



Access performance data of your plant remotely, anywhere in the world.

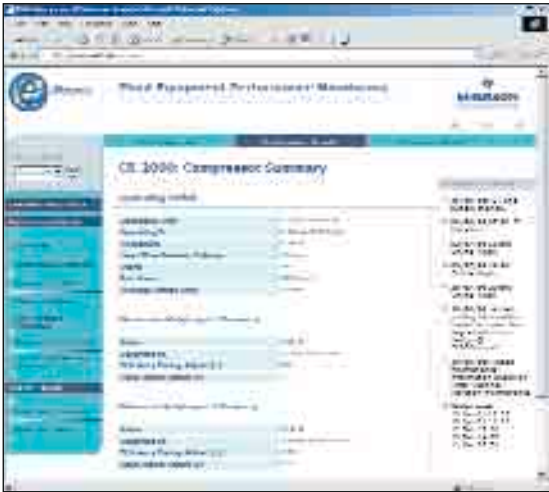


Performance results are displayed within a secure internet environment.

current equipment performance data, customized reports, and graphical representations, all via a standard web browser.

The service can be accessed at any time wherever you have access to the Internet. Users can assess the effect the performance of plant equipment is having on the efficiency of the plant in terms of throughput, downtime, and stability. Customers can troubleshoot

Access in secure web environment.



Compare actual efficiency to original design in graphical or tabular format right in your web browser.

equipment problems early, remotely and at low cost.

e-efficiency can be applied to and provide accurate monitoring of;

- Boilers
- Compressors
- Expansion
- Turbines
- Furnaces
- Gas Turbines
- Heat Exchangers
- Hydraulic Turbines
- Pumps
- Steam Turbines

It also tracks the cost of the degradation in equipment performance in real-money terms.

essential decisions based on hard facts. Maintenance schedules can be optimized to extend run times and plan activities accurately.

With e-efficiency you can:

- Compare unit performance across multiple units
- Access performance data remotely anywhere in the world
- Produce accurate reports against performance targets
- React in a timely manner to changes in equipment performance
- Optimize cleaning and maintenance cycles
- Increase operating performance of the production facility.

For more on Emerson's e-efficiency, visit: www.e-efficiency.com.

e-efficiency enables users to make

Early identification of equipment problems.



“We see e-efficiency as a means of gathering the pertinent information via the worldwide web and working with onsite operators and engineers to manage the equipment performance.”

—David Stewart

Wood Group Engineering
USA

Emerson Can Help



Better operational efficiency through precision control is something Emerson can help you achieve through our global network of industry and application specialists.

Our industry experts in chemical, food & beverage, oil & gas, life sciences, pulp & paper, and many other industries have the experience to apply the full range of advanced control solutions for your operations.

Chemical

Because no two chemical operations are alike and your needs are unique, the last thing you need is a "standard" solution. From industrial chemicals to fibers, Emerson has the people who can make your goals a reality.

Solutions are available to the following chemical processes:

Industrial

- Inorganic acids
- Alcohols
- Liquified gases
- Paints
- Resins
- Adhesives
- Solvents
- Detergents

Specialty

- Catalysts
- Laboratory chemicals
- Dyes
- Inks
- Pigments

Fibers

- Nylon
 - Polyester
 - Rayon
- and many more.

Food & Beverage

From brewing to bottling and from mixing to baking, Emerson offers you our best in class products, services, and personnel. From beer to butter, we can work with you to find the perfect solution for your needs. Whether you require engineering services or plant optimization, Emerson can help you achieve your goals.

Solutions are available to the following food & beverage processes:

- Brewing process control
 - Citrus process control
 - Dairy products
 - Beverage processing
 - Sugar production
 - Corn processing
 - Solutions for batch and blending
 - Evaporators
 - Specialty equipment design
 - Regulatory compliance
- and many more.

Oil & Gas

Our Oil & Gas experts have the ability to work with you to assist in developing plans for new facilities as well as in optimizing the performance of your current environment. From pipelines to refining, Emerson brings the experience that is necessary to achieve operational efficiency.



Solutions are available to the following upstream and downstream processes:

Upstream

- Platform automation
- Wellhead control
- Gas processing
- Gas liquefaction
- Utilities

Refining

- FCC units, CRR units
- Hydrocracker units
- Delayed coker units
- Blending

Petrochemical

- Olefins
 - Nylon intermediate
 - Polymers
 - C4 hydrocarbons
 - Aromatics
 - Polyolefins
- and many more.

Achieving operational efficiency.

Life Sciences

Regulatory compliance. Genome-based rapid drug discovery. Validated manufacturing automation suites and seamless integration—from drug conception through packaging. For many pharmaceutical and biotech companies, the fast-changing worlds of compliance and technology have created the need for a partner who understands both their unique process requirements and the technology best suited to ensure consistent quality.

Solutions are available to the following pharmaceutical and biotech processes:

- Batch reactors
- Blending
- Buffer / media preparation
- Centrifuging
- Crushing
- Crystallization
- Diffusing
- Distillation
- Evaporating
- Fermenting
- Filtration / ultrafiltration
- Hydrogenation
- Mixing
- Packaging
- Separating
- Sterilize in place
- Streamline regulatory compliance
- Temperature ramping
- Vacuum pan control and many more.

Pulp & Paper

From pulping to coating, including recovery and power systems, Emerson brings the experience that is necessary to have a positive effect on your bottom line.



Solutions are available to the following pulp & paper processes

- Pulping
- Digesters
- Brown stock washers
- Bleach plant
- Recovery
- Evaporation
- Recovery boiler
- Lime kiln
- Slaker and causticizing
- Papermaking
- Stock preparation
- Paper machine and many more.

Contact us today on our full breadth of solutions at:

www.EmersonProcess.com/solutions

Industry and application experts ready to help.

"We wanted to greatly reduce the time required to engineer, test and install the automation portion of this project. We expect this project to be completed in half the time of prior projects and look to time-saving technologies like DeltaV to help us accomplish our goals."

—Per Kronovall
AstraZeneca
Europe

Customers requesting this brochure have also requested the following:

- **DeltaV System Overview** (brochure)
- **DeltaV. We Do Smart Plants** (brochure)
- **DeltaV System—Built for Batch** (brochure)
- **Comprehensive set of product data sheets**
- **Interactive demo CD**
- **DeltaV product information CD**
- **mimic product information CD**
- **Customer Case Studies video CDs and DVD**

To locate an Emerson Process Management representative or sales office near you, or to receive any of the aforementioned brochures, CDs and DVD, visit our website at:

www.EasyDeltaV.com, or call us at:

Asia Pacific: 65.777.8211

Europe: 41.41.768.6111

Latin America: +1.512.832.3572

North America: +1.888.FOR.FRSI

(+1.888.367.3774)



Emerson Process Management

Fisher-Rosemount Systems, Inc.
8301 Cameron Road
Austin, Texas 78754 USA
T +1.512.418.7400
F +1.512.418.7505

www.EasyDeltaV.com

PlantWeb, DeltaV, the DeltaV design, Emerson Process Management and the Emerson Process Management design are marks of one of the Emerson Process Management group of companies. All other marks are the property of their respective owners. The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time without notice.

© Fisher-Rosemount Systems, Inc. 2002 All rights reserved.

