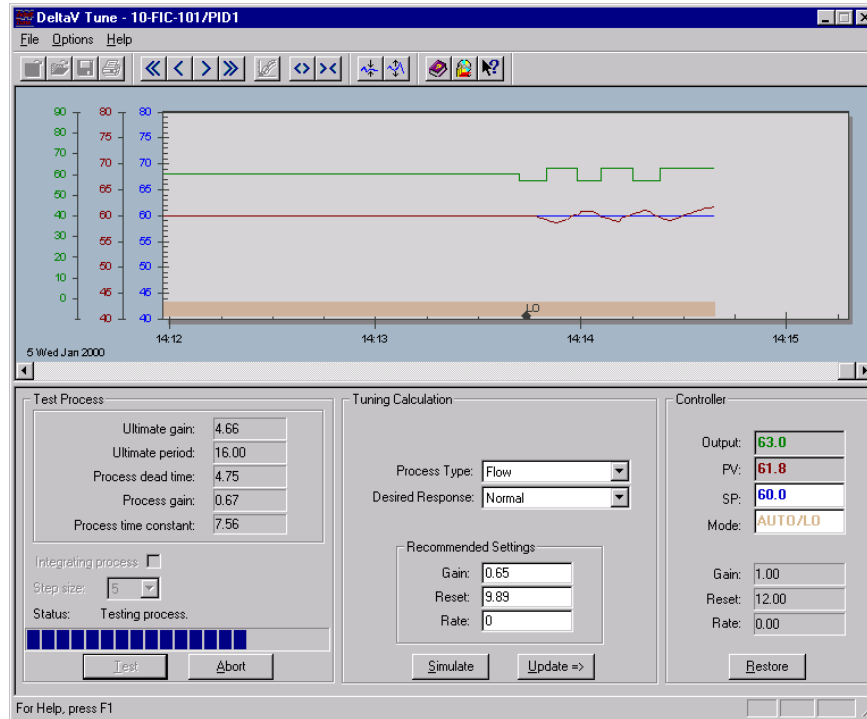


# DeltaV Tune\*



Maximize loop performance with advanced techniques and user-friendly graphic displays found in DeltaV Tune.

- Quick and easy loop tuning
- Features sophisticated analysis and simulation tools for the advanced user
- Full integration with the DeltaV system means no communications setup
- Supports FOUNDATION fieldbus based control loop tuning
- Improved control loop performance

\*DeltaV Tune is available for DeltaV release v8.4 and earlier. Starting with DeltaV release v9.3, DeltaV Tune has been replaced by DeltaV InSight, which includes all the functionality of DeltaV Tune, plus much more. See DeltaV InSight product data sheet for more information.

## Introduction

When your control loops are poorly tuned, product quality suffers. Production drops, production costs increase, and you take environmental and safety risks your facility can't afford.

DeltaV Tune gives you out-of-the-box tuning solutions for your PID and fuzzy logic control loops. Based on a patented, field-proven algorithm for calculating control loop parameters, DeltaV Tune *minimizes the time required to establish stable, responsive control loops*—precisely what your facility needs to stay productive, profitable, and competitive.



## Benefits

**Quick and easy loop tuning.** DeltaV Tune quickly and automatically determines optimal tuning parameters for *PID and Fuzzy Logic control loops*. Processes with fast to moderately slow dynamics can be *tuned in minutes*. The result: faster startups, swifter response to changing process conditions, and better plant economics.

**Features sophisticated analysis and simulation tools for the advanced user.** DeltaV Tune provides sophisticated but easy-to-use loop simulation and analysis tools. This allows control loop performance to be predicted before the new tuning parameters are updated in the controller.

**Full integration with the DeltaV system means no communications setup.** DeltaV Tune is fully integrated into your DeltaV system and can be context-launched from the Operator Interface, Explorer, or Control Studio. Just select the control loop and *move seamlessly between applications* with the click of a button. No communications configuration required.

**Supports Foundation fieldbus based control loop tuning.** As of DeltaV v7.2, DeltaV Tune has the ability to tune PID blocks that are executing in a field device such as a valve positioner or a transmitter. This functionality is available regardless of the device manufacturer, provided the device meets Foundation fieldbus standards.

**Improved control loop performance.** DeltaV Tune gives you the performance benefits obtained from tight loop control. A *stable, responsive control* loop reduces process variations. This increases productivity; improves product quality and process safety; and reduces production costs.

## Product Description

DeltaV Tune provides an on-demand tuning capability that helps keep your process running at peak efficiency. The automated process testing and easy-to-use graphical interface simplify tuning fuzzy logic and PID loops.

It is estimated that *two-thirds of all process loops are improperly tuned*. Part of the problem is reliance on manual tuning techniques. Facility staffs often lack the time, skill, or patience to continuously tune PID and fuzzy logic controllers.

Using DeltaV Tune, no special control knowledge or initial settings are required to tune a control loop for optimum operation. The *DeltaV Tune interface* uses graphical prompts to walk you through the loop tuning procedure with point-and-click ease. You won't have to rely on one or two tuning experts to keep your facility running at peak efficiency. Operators, engineers, and maintenance technicians will all find it *easy to learn and use*.

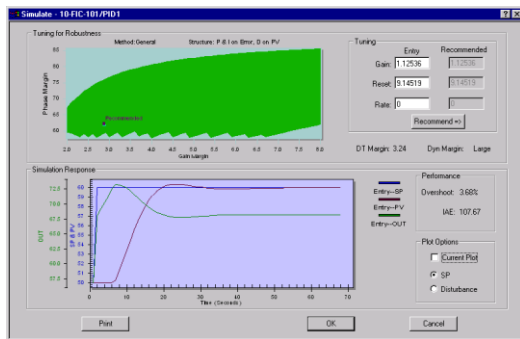
DeltaV Tune uses a *patented relay oscillation principle* to calculate process control loops' tuning parameters. Based on the Aström-Hägglund algorithm, it uses an enhanced technique for defining a first-order process model with dead time. These combined patented functions significantly reduce the time required to establish a stable and responsive control loop for your process.

A closed-loop test procedure determines dynamic loop characteristics during tuning. For security, the loop remains under control during the process test. Because the technique is not tied to any particular process model, *DeltaV Tune can tune virtually any fuzzy logic or PID control loop*.

The algorithm works equally well *with fast, slow, self-regulating, or integrating processes and with loops with dead time or a noisy output signal*. Because DeltaV Tune is immune to a significant level of noise and process load disturbances, you can tune the most difficult loops with confidence.

Once process dynamic characteristics have been established, you can choose from a menu of performance settings, ranging from no overshoot to very aggressive. DeltaV Tune also provides settings for loops based on process type. Advanced features are provided to support phase and gain margin, lambda, and Internal Model Control tuning.

For the advanced user, DeltaV Tune provides sophisticated but easy-to-use loop simulation and analysis tools that allow control loop performance to be predicted before the new tuning is used. The user 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. The recommended tuning parameters are shown in the robustness plot. To examine different parameters, just click anywhere on the plot and DeltaV Tune calculates new tuning parameters and shows you the simulated loop response.



Loop simulation and robustness plot provide advanced analysis.

DeltaV Tune provides a [report of the tuning results](#). The report includes the identity of the operator performing the tuning, the time it was done, initial and final tuning parameters, process dynamics, and the tuning rules used. Report information may be saved to file and used for future reference.

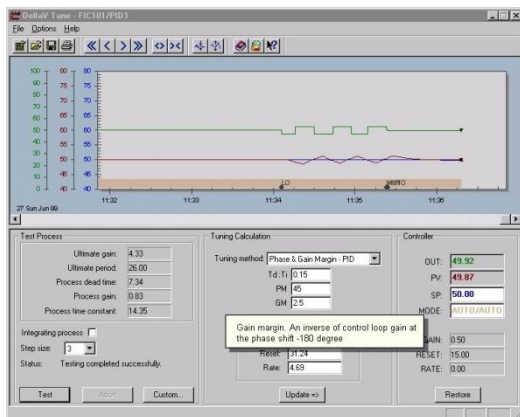
An experienced user can take advantage of the [Expert](#) tuning option and use alternative tuning rules such as: Modified Ziegler Nichols, Phase and Gain Margin, Lambda, Lambda-Averaging Level, Lambda-Smith Predictor, and Internal Model Control.

**Phase and Gain Margin Rules for Proportional, Integral, and Derivative Control (PID).** This control design has a default phase margin of 45 degrees. This phase margin, in most cases, will cause very little overshoot. A slower response with less overshoot for most processes can be achieved with a greater gain margin and phase margin of 60 degrees.

**Lambda.** This control design for PI control allows the desired closed-loop-response-time-constant-to-open-loop-time-constant ratio to be specified through the lambda factor.

**Lambda-Averaging Level.** This design works for non-self-regulating level loops with PI control.

**Lambda-Smith Predictor.** This design is most effective when the process deadtime is greater than the process time constant. It should be used with the Smith Predictor template.



Selecting the Expert option enables advanced features.

**Modified Ziegler Nichols Rules for Proportional and Integral Control (PI).** This control design is based on the Ziegler-Nichols tuning rules with modifications minimizing overshoots.

**Internal Model Control (IMC) Tuning.** This design provides settings for proportional, integral, and derivative control and assumes a first-order process with a time delay. Process model is identified during tuning test. The IMC design is especially useful when a process has a delay longer than half the process time constant. The

process time delay and the process time constant are shown in the Process Test Results Panel area.

You do not have to retest the loop when using the Expert option. Once DeltaV Tune has obtained the process dynamics for a loop, it calculates new controller settings for different design selections.

**Ordering Information\***

Description	Model Number
DeltaV Tune for DeltaV ProfessionalPLUS Station	Standard
DeltaV Tune for other DeltaV workstations	VE2142

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**Related Products**

- **DeltaV InSight.** Control performance monitoring and loop tuning application embedded in DeltaV. Identifies control problems and improves control performance with automatic process learning, loop diagnostics, on-demand and adaptive tuning, and automatic report generation.

**Prerequisites**

- A DeltaV workstation running release v8.4 or earlier. Each workstation running DeltaV Tune must have a license. A single license for DeltaV Tune is included in the DeltaV ProfessionalPLUS Station license bundle.

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