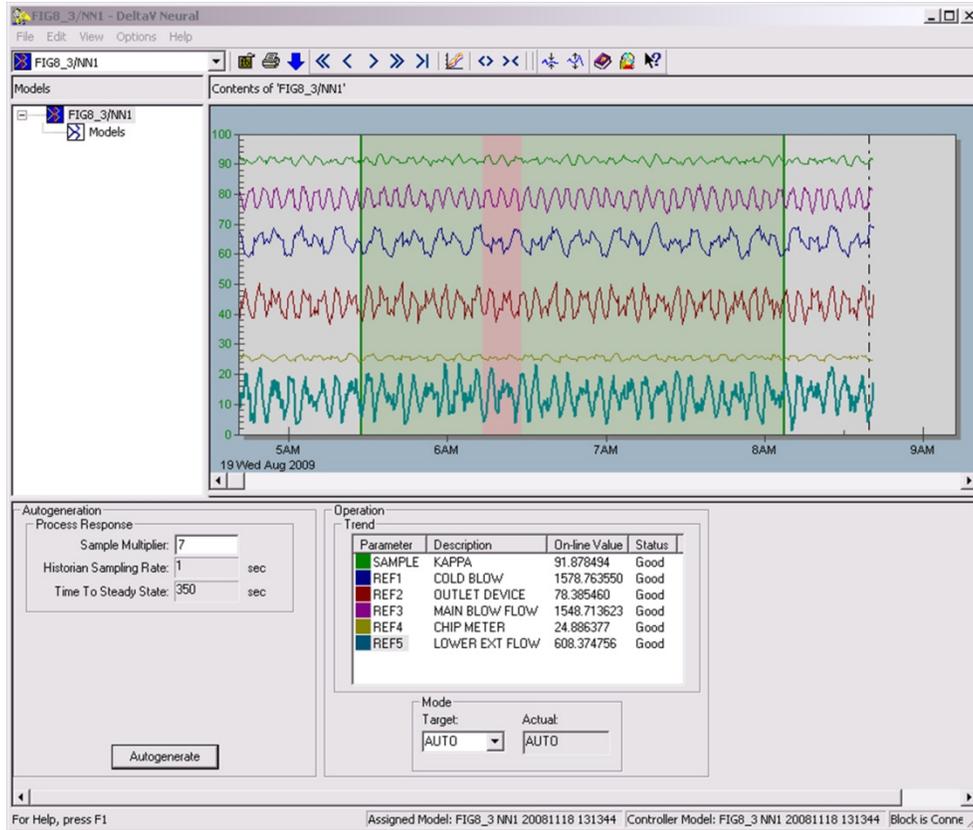# DeltaV™ Neural

DeltaV Neural provides easy-to-use tools for developing and training the neural network model.

■ Easily creates virtual sensors using neural networks

■ Neural net executes right in the DeltaV™ controller as a function block

■ Automated pre-processing, design, training and verification

■ Expert mode allows interaction in the neural network development

Introduction

DeltaV™ Neural gives you a practical way to create virtual sensors for measurements previously available only through the use of lab analysis or online analyzers. DeltaV Neural is easy to understand and use, allowing process engineers to produce extremely accurate results even without prior knowledge of neural network theory.
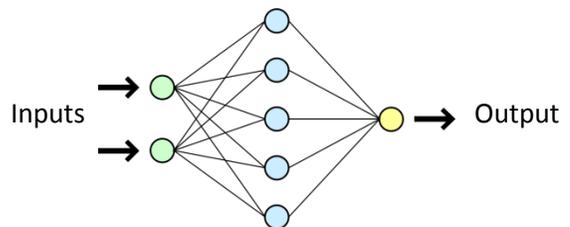
Neural network for inferential property calculations.

Benefits

Improves product quality by reducing variability.
Continuous "virtual" measurement of qualitative and analytical parameters allows for much tighter control of many process parameters. This provides automatic compensation for unmeasured disturbances and process changes. DeltaV Neural enables "if-then" analysis of a process change based on future prediction of critical parameters.

Increases process availability. Provides a backup and crosscheck on a measurement provided by a sampled or continuous analyzer like mass spectrometers and stack analyzers. Provides continuous measurement for all parameters measured by multi-streaming analyzers.

Saves time using automated network training.
Take advantage of incredibly easy-to-understand graphical tools for configuration and training of the network. Drag-and-drop configuration and automatic historical collection make DeltaV Neural accessible to process engineers in need of real-time qualitative analysis.

Runs In the Controller for fast, solid execution.
Running the Neural Network right in the DeltaV controller means that if you have redundant controllers, you therefore have redundant Neural Nets at no incremental cost. It executes as fast as once every second. In addition to performance benefits, this methodology allows implementation without the requirement for costly host computers interfaced to the DeltaV system in a supervisory fashion.

Product Description

DeltaV Neural offers you an entirely new approach to the implementation of virtual sensors with neural networks. Using the DeltaV Neural function block you can identify up to 20 individual process measurements to be correlated with lab entry or continuous analyzer data. No step testing or manual disturbance of the process is necessary in order to implement the neural net.

DeltaV Neural is implemented as a Function Block that executes in your DeltaV controller. This allows you to use the standard tools of DeltaV Control Studio to define the necessary input variables along with manual lab entry data or data from a continuous analyzer. An example configuration is shown in the following illustration:
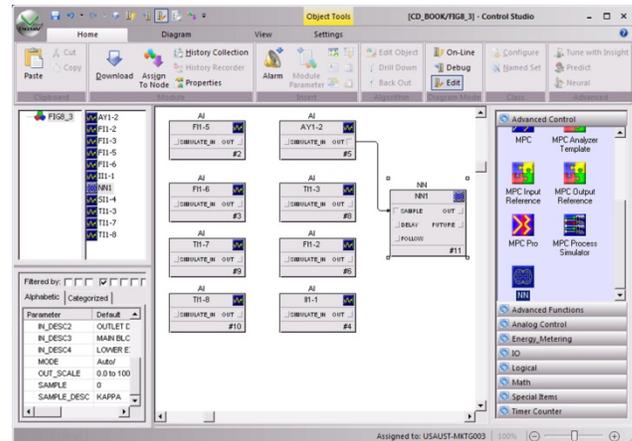

DeltaV Neural implementation with Function Blocks in Control Studio

The DeltaV Continuous Historian automatically collects data on the inputs used by the Neural Net Function Block-- completely eliminating the need to configure a process historian. Alternatively, you may import existing historical data into DeltaV Neural using commonly available tools such as Microsoft Excel for data preparation.

DeltaV Neural will automatically perform the training needed to build the network and stop when over training is detected. The historical data used to train the model can be easily viewed, and any portions containing abnormal operating conditions may be excluded using easy graphical tools.

Upon completion of the automated network training, the sensitivities of each process input may be viewed graphically. DeltaV Neural is capable of eliminating any variables shown to have little or no effect on the output.
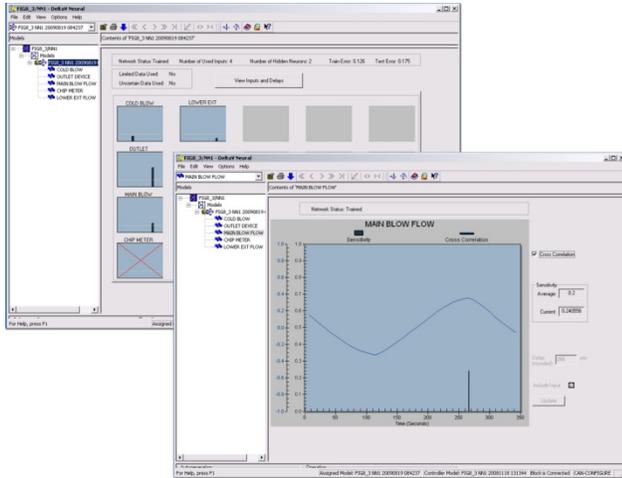
Easily view and edit the sensitivity of each input.

By selecting the "expert" option, you may actually modify the sensitivity of each individual input by modifying the correlation between input and output.

Additionally, experts have the option to specify such detailed parameters as outlier limits, max/min number of hidden neurons, and maximum training epochs. It is not a mandatory requirement for the user to specify any of the preceding values: they are intended for the use of expert users only.

Verification of actual and predicted values vs. samples gives the user an easily understandable picture of how the network behaves. Verification may be done against original data or any other user selectable timeframe.
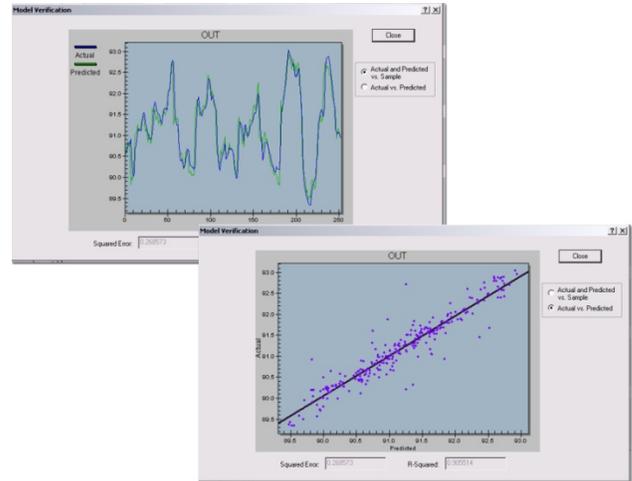
Graphical verification of actual vs. predicted.

DeltaV Neural is licensed by the function block, and several Neural Network blocks may be executed in the same controller simultaneously. Refer to the specifications section of this document for estimated controller loading calculations.

Specifications

DeltaV Neural Specifications	
Outputs	1 current value and 1 future value based on current inputs.
Inputs	Up to 20 parameters from anywhere in the system.
MD Controller loading for a 1-second execution rate.	Approximately 1.55% per fully populated NN function block.

Ordering Information

Description	Model Number
DeltaV Neural—Single Neural Net Function Block	VE3153F01

Prerequisites

- DeltaV Neural is available in DeltaV v6.3 and later only.

- DeltaV Neural executes in both a DeltaV controller and DeltaV Application Station or ProfessionalPLUS Stations.

- A DeltaV Professional or ProfessionalPLUS Station is required to configure DeltaV Neural.

www.DeltaV.com

EMERSON
Process Management