# SOLUTIONS PROFILE

## ADVANCED PROCESS CONTROL

USING FUZZY LOGIC IN LOGIX

BASIC SYSTEM FEATURES

- Library of components

- Hierarchical fuzzy systems

- No limits on number of inputs, outputs, terms and rules

- Several methods for the fuzzy system analysis

- Export fuzzy systems to Logix Add-On Instructions (.L5X XML files)

- Import fuzzy systems from Add-On Instructions

- Online monitoring and tuning of fuzzy Add-On Instructions in running Logix controllers
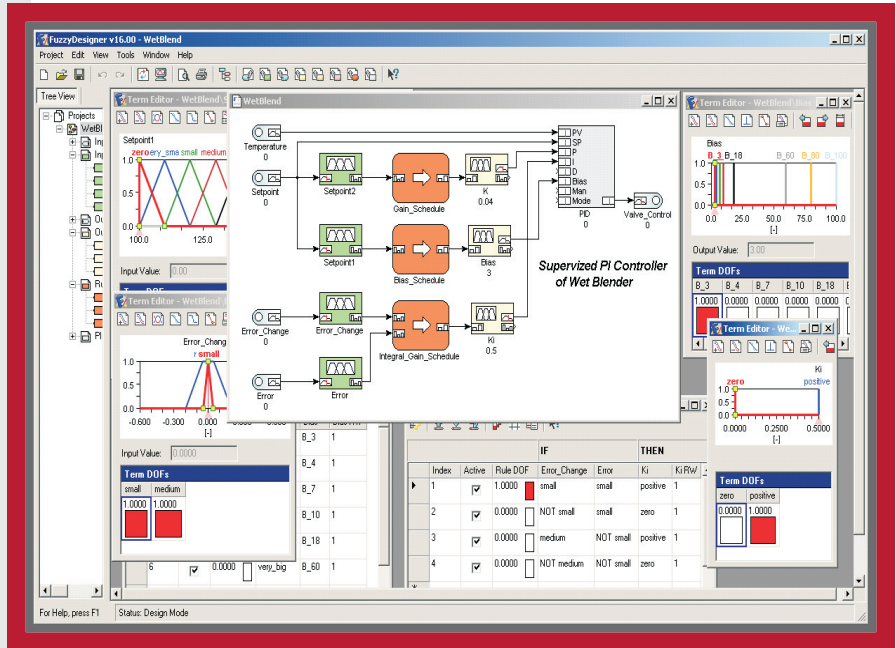
APPLICATION SCOPE

- Advanced applications in industrial automation

- Intelligent control systems

- Process diagnostics

- Decision-making and expert systems

- Intelligent monitoring systems

- Forecasting systems
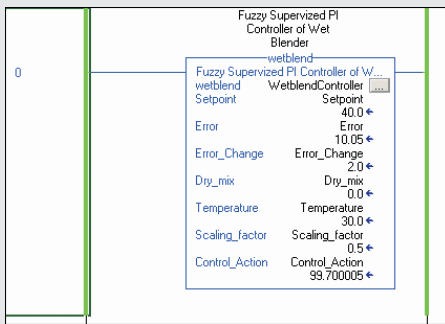
Add-On Fuzzy Instruction in Logix

RSLogix 5000™ FuzzyDesigner is a software package for designing fuzzy logic algorithms for Logix controllers.

Fuzzy logic allows engineers to exploit their expert knowledge and heuristics represented in the form of vague linguistic IF-THEN implication rules and transfer it to a function block.

FuzzyDesigner allows engineers to enhance the functionality of existing or new control and decision making systems in various branches of industry. The fuzzy system designed and generated by FuzzyDesigner might be used in control systems as a direct nonlinear fuzzy-rule based controller or intelligent gain scheduler (fuzzy supervisor) of PID or state feedback controllers. Fuzzy logic solutions are especially useful for controlling complex systems where standard PID control fails.

FuzzyDesigner generates Add-On Instruction (AOI) in L5X file format. The user can then import the fuzzy AOI into RSLogix 5000 projects. Fuzzy AOI's, like any other AOI, can be used by any of the programming languages (Function Block Diagram, Ladder Logic, or Structured Text). Finally, FuzzyDesigner allows the user to online monitor and tune the fuzzy AOI directly in the running Logix controller.

Rockwell Automation

RSLOGIX5000 FUZZYDESIGNER

FuzzyDesigner includes a library of components from which a fuzzy system performing nonlinear input-output mapping can be designed. Hierarchical structure enables the designer to decompose a complex fuzzy system into smaller and simpler parts, which reduces the internal complexity of a fuzzy model and results in fewer fuzzy rules and easier insight into the system operation.

FuzzyDesigner offers several methods for fuzzy system analysis. Simulation mode allows you to watch the influence of individual component values. 2D and 3D graphs with many options allow insight into the complex nonlinear mappings realized by the fuzzy algorithm.
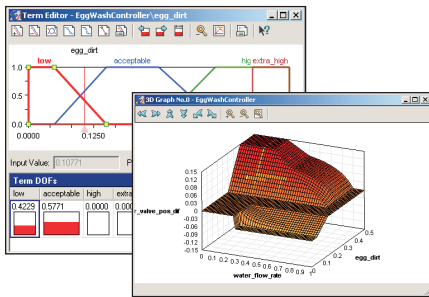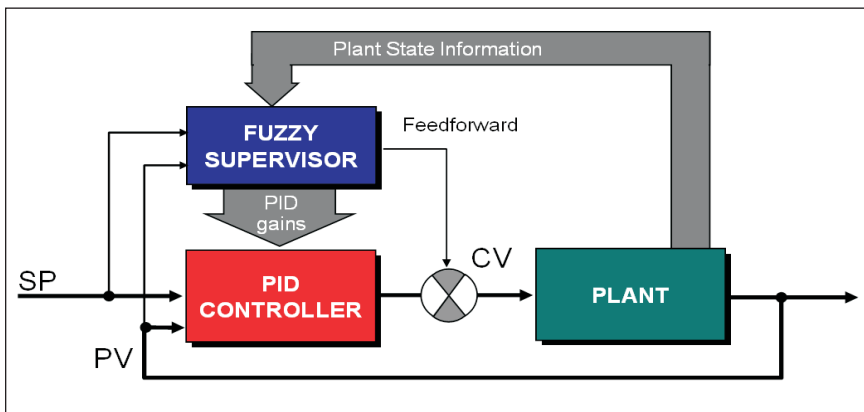
CASE STUDY

WET BLENDING PROCESS IN FOOD INDUSTRY
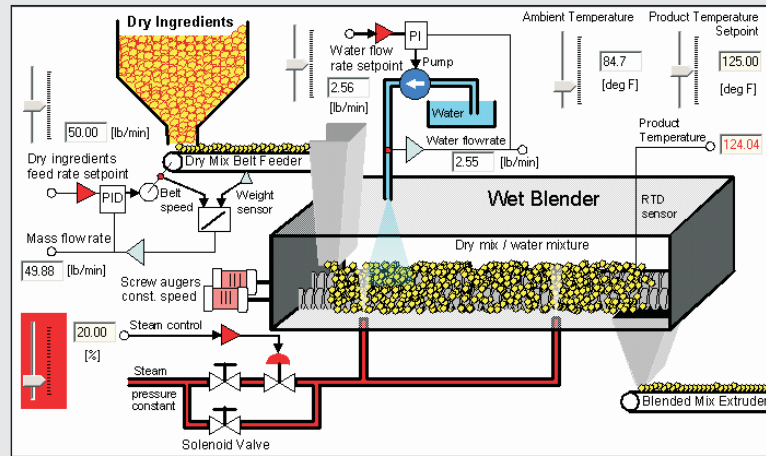
Control system for the technology of wet blend food processing consists of many control loops. Any attempts for using standard PID control of the product temperature were not successful due to effect of the disturbance variables and significant transportation delay between the control action and its effect on temperature. A single setting of controller parameters does not satisfy control requirements for the whole spectrum of applied recipes. One of the solutions, which satisfies the requirements in wide range of operating conditions, is a nonlinear PI controller with scheduled gains using expert fuzzy rules based on applied recipe and other operating conditions.

FUZZY SUPERVISED PID CONTROLLER

OTHER CASE STUDIES

- Thermal Test Chamber
- Intelligent Filter
- Diagnosis of a Motor Conditions
- Egg Wash Machine
- Anti-sway Crane Control
- Coupled Drives

Contact Rockwell Automation to learn how RSLogix5000 FuzzyDesigner software and our advanced process control solutions team can help improve performance of your manufacturing plants.

Logix is trademark of Rockwell Automation.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

www.rockwellautomation.com