Since 1996, *IntelliOpt* has delivered proven Advanced Process Control & Optimization solutions to over 80 refining and chemical units worldwide. Its low cost multivariable predictive control, advisory systems, and neural network based solutions are delivered by a *global network of independent specialists*, assuring the highest value at the lowest cost.

PUBLICATIONS:

- ASTM Manual 58,Ch.15:Modern Computer Process Control Refining Units
- Hydrocarbon Processing Advanced Control Handbook, 2004

SOLUTIONS

Our solutions are not limited by individual technologies and software packages. We can, and have developed solutions by using a best mix of technologies to overcome individual technology limitations:

- Domain of mathematical models,
- Near (but, not always global) optimization of heuristics.

PRODUCTS

- GMAXC™, Multivariable Predictive Controller
- G-OPT, Global Real-Time Optimizer
- Z-Way™, Multivariable Fuzzy Logic Controller
- DEA™, Decipher for Events and Alarms, an Alarm Management System

Our products are designed for automation and optimization of your processes, instead of focusing on software functions and programming.

SERVICES

- Advanced Process Control, Multivariable Predictive Control and Optimization
- Consulting – Modernization plans, Technology Evaluation, Bid Package Preparation, Contractor Selection
- Feasibility Studies
- Advisory/Expert Systems, Abnormal Situation Management (Gensym G2)
- Neural Networks based Property Estimation models
- Process Simulation Models
- Training – Loop Tuning, APC, MVPC, Advisory Systems, Neural Networks

PROJECTS/EXPERIENCE

APC/MVPC	Optimization	Advisory Systems	Neural Networks
Acrylonitrile	Plant Steam System	Alkylation	Caustic Unit
Air Separation	Refinery Feasibility	FCCU	Crude Oil Wells (offshore)
Delayed Coker	Waste Incinerators	Hydrocracker	TA/PTA
Ethylene		H2 Plant	
Gas Plant		Reformer	
Hydrogen Plant		Sat Gas Plant	
LPG		Pipelines	
Methanol			
PolyCarbonate			
TA/PTA			

Typical Benefits:
- Throughput/Yield increase: 2% - 5%
- Energy Reduction: 4% - 10%
- Product Quality Variation Decrease: 30% - 60%
- Assist Operators for process monitoring and control

IntelliOpt's software and services have been used worldwide:
- N. America: USA, Canada, Mexico
- S. America: Argentina, Venezuela
- Europe: Austria, Belgium, Denmark, France, Germany, Italy, Poland, Spain, Sweden
- Asia: China, India, Japan, Kuwait, S. Korea, Singapore, Thailand

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INTELLIOPT

Intelligent Optimization Group

ADVANCED AUTOMATION SOLUTIONS

Real Time Solutions For Profitability

***IntelliOpt* specializes in:**
- **Improving the profitability of Process Plants by the applications of Advanced Automation Solutions**

IntelliOpt

GMAXC

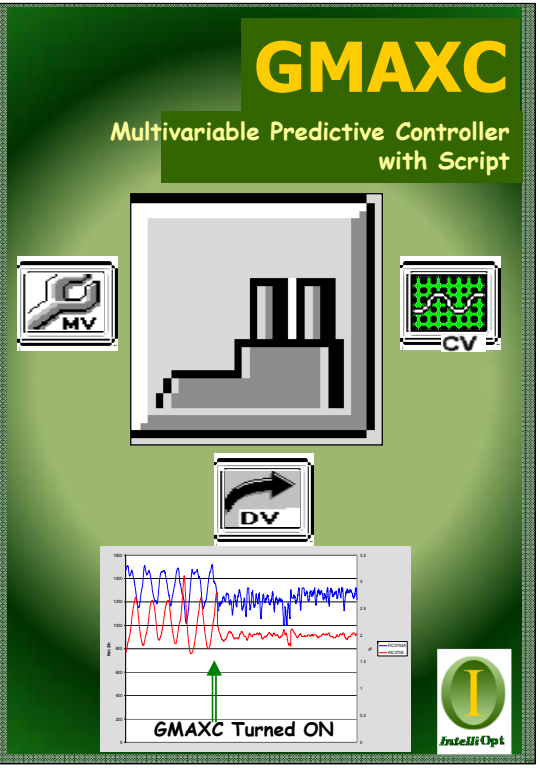
GMAXC: Unleash the power of **Multivariable Predictive Control** (MVPC) to realize process benefits in terms of:

- Increased throughput/capacity,
- Improved yield,
- Tighter product quality control,
- Reduced energy consumption, and
- Operator convenience

As a fully integrated package, GMAXC includes:

- GMAXCID: Simplified process identification with heuristic based data validation and collation. Combined with Box Factorial design of plant tests, GMAXCID can save plant testing times by up to 75% over conventional dynamic identification methods
- SCRIPT add-on option to allow process specific nonlinear control action and process event based *ad hoc* adaptation, including fast ramping capabilities
- GMAXCOPC: an OPC Client for simplified fill-in-the-blanks type configurable interface with plant DCS and database systems
- Non-linear optimization with control;
- Integration of Microsoft Access database type file for history collection with PC based online execution. The database can be used for controller performance analysis and audit.

GMAXC is specifically designed to offer MVPC technology at a commodity level for rapid assembly line type implementation, and can also replace other MVPC controllers to reduce life cycle costs.



G-OPT

G-OPT: A General Purpose Optimizer program based on genetic algorithm for Real-Time Optimization (RTO):

Minimize $F(X_1, X_2, ...X_n)$, subject to:

- $X_{i,low} <= X_i <= X_{i,high}$ $1 <= i <= n$
- $Y_{j,low} <= Y = G_j(X_1, X_2, ...X_n) <= Y_{j,high}$, $0 <= j <= m$

where F and G functions can be nonlinear and discontinuous

- Model programming and customization with VBA script
- User specific steady state detection and ad hoc logic can be easily implemented
- Some independent variables may be specified as ZOOM – Zero or One Mixed Integer for ON/OFF type solutions
- Online Run frequency option along with Demand Run execution
- Multiple problem capability with Load/Save feature
- Microsoft Excel Interface option for data input/output

Ideal for process unit optimization and integration with MVPC (multivariable predictive controllers) like *IntelliOpt*'s GMAXC.

Z-Way

Z-Way: An easy to apply **Fuzzy Logic Controller**:

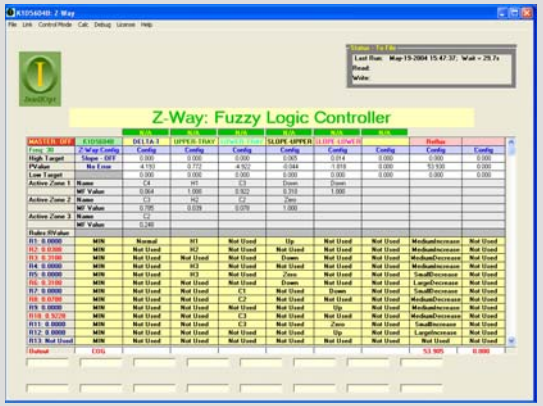
- Formulation Uses Operator Experiences and Basic Chemical Engineering
- Avoids Costly and Difficult Plant Tests
- Configuration based on Fill-in-the-Blanks and Click/Select Type options
- Reduces Application Implementation Time
- Field Proven and in-use on Commercial Distillation (Azeotropic) Towers

Technology: A four step approach to map input data nonlinearly into outputs:

- Fuzzifier - Models the behavior as a matter of degree, rather than in precise discrete categories
- Rules - Based on simple operating heuristics and engineering principles (e.g. If Tray is Cold Then Decrease Reflux by a Small Amount)
- Inference Engine - Based on the values of the inputs (e.g. multiple tray temperatures), the Z-Way controller checks all the rules and activates the sub-conditions to be made in the outputs (e.g. reflux flow, reboiler steam flow)
- Defuzzifier - Similar, but, opposite of Fuzzification, the output membership function is converted into a practical number which can be implemented by a PID controller

Advantages:

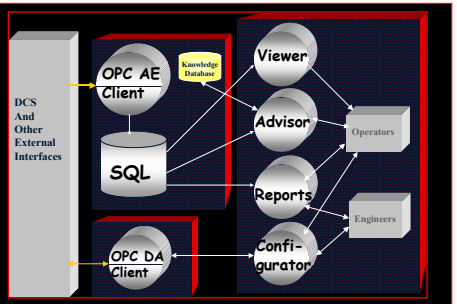
- Typical Implementation Time as Low as 1 Week
- Ideal for Control Problems Requiring multiple PIDs
- Time Based Hold on Output Option-Useful for Slow Processes
- Multivariable - 6 Inputs X 2 Outputs



Includes:

- Script Option
- Embedded **OPC** Client

DEA



DEA (Decipher for Events and Alarms) : A Comprehensive **Alarm Management System** for Collecting, Archiving, Displaying, Interpreting and Managing Process Alarm and Events, including Metrics for Alarm System Performance:

- Real-Time Filtered Alarm Viewing,
- Excel Add-In (.xla) to Analyze and Interpret A&Es,
- Advisory system for root cause identification and corrective action

Benefits: Improves Operator Productivity, Raises Operational Safety Levels, Identifies Malfunctioning Instrumentation