Service Excellence for Industry

MASON-GREY

PROCESS SIMULATION

MASON-GREY provides simulation services to manufacturing and process industry clients enabling the testing of integrated control systems through the use of object oriented dynamic simulation. Dynamic simulation dramatically reduces the cost and time required to implement new control systems and technologies, and can be used for operator training using the actual control hardware before installation of a system!

The dynamic process simulation is connected to the control systems through software and hardware that allow the system to be checked without the control system I/O being present. This allows the control system I/O to be shipped to the field and installed while the system configuration is being checked.

Simulations are built by picking equipment, control, and communication objects from pre-developed object libraries and placing them on a worksheet. The objects are then connected together to form the process model. Each object has a dialog box with physical parameters that need to be filled in such as pipe size, tank height and width, pump curve coefficients, etc.

Object fidelity will range from low to high fidelity depending on startup risks and operation training requirements.

A low fidelity model is created using empirical equations describing equipment effect on the process. The piping data associated with the process are estimated. Generally this type of model provides simulation accuracy of within 30% of the actual plant data.

A medium fidelity model is one developed with a more complete set of empirical equations that describe equipment effects with piping information better approximated. A simulation precision of within 15% can be achieved by models in this category.

High fidelity models are made up primarily of first principles' equations that describe the equipment being modeled. Piping parameters are obtained from engineering data or actual field investigation. **The precision of high fidelity simulation model is within 5% of the plant data.**

Models are typically built from process and instrumentation diagrams (P&ID) and instrument specifications (i.e. transmitter ranges). Selected objects will be tagged with equipment names, numbers, and P&ID numbers to facilitate model navigation.

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Tuning The Model

The initial model will be built using simulated controls (from the controls library) to tune and verify the model operation against P&ID specifications. Once the model operation is verified the control objects will be replaced with control system communication objects. Each object will be tagged based on the plant tagging specification. A tag cross-reference to control system I/O will typically be provided by the configuration team in a database or spreadsheet form to the simulation builder. Many distributed control systems and programmable logic controller configuration software packages can generate the needed cross-reference. This cross-reference tag list will then be used to automatically fill in the tagged communication objects with the specific control system I/O dialog items. This allows the simulation to be built before the control system configuration has been completed, thus allowing testing to begin as soon as configuration is completed or during configuration.

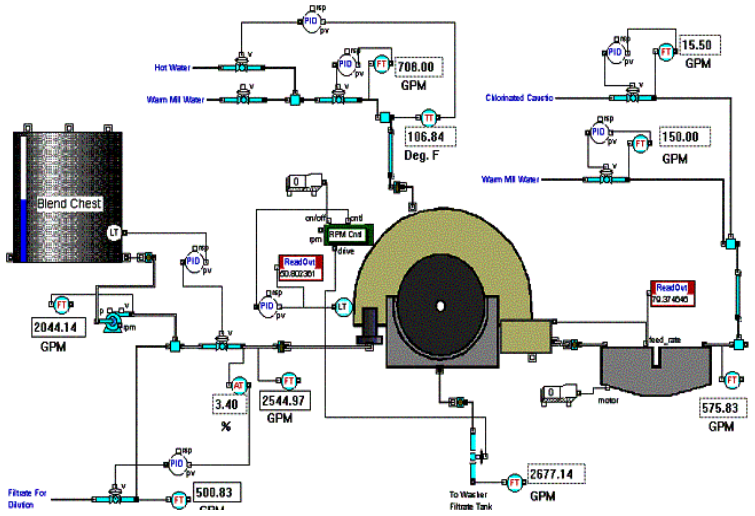
Simulation Enables

Project startup schedules shortened by 14 to 42 days.

Typical field labor savings from $81,000 to $300,000.

Savings resulting from early startup by avoiding interest cost and penalties.

Projects achieving full design production early.



Sample of Dynamic Simulation of a process showing actual process data.

PLATFORMS

Fisher ProVox	Yokogawa Centum
Rosemount RS3	Honeywell TDC3000
Fisher DeltaV	Bailey Infi-90
Foxboro IA	A-B PLC's
Moore APAC	A-B ControlLogix
ABB Master	A-B ProcessLogix
Valmet Dymatic	Modicon 984 PLC's

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