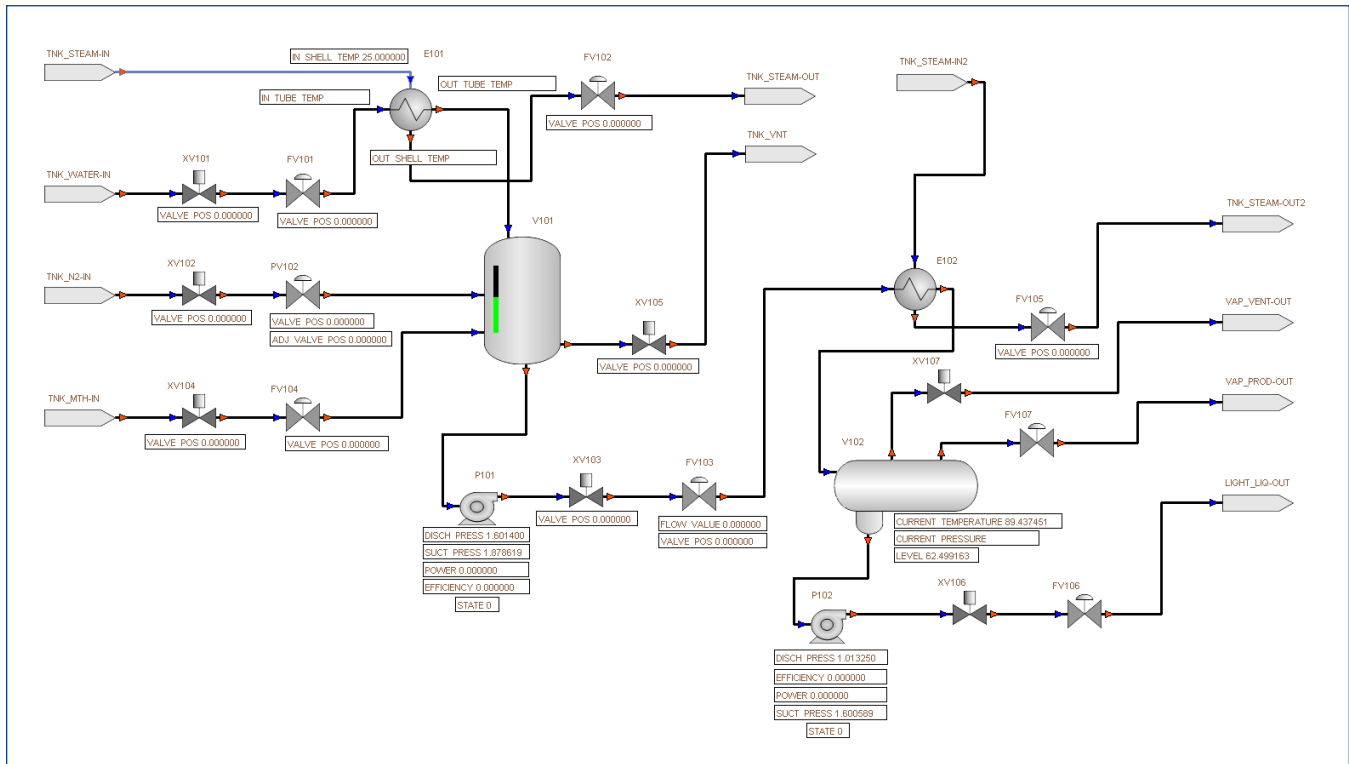


# Mimic™ Advanced Modeling Objects-Core



- Intuitive unit operation modeling objectives
- Scalable from medium to high fidelity simulation
- Intuitive configuration parameters allowing for quicker model building
- Includes common process plant unit operations found in the process industries
- Easy handling of individual stream component properties

## Introduction

Mimic Advanced Modeling Objects add sophisticated modeling objects into the Mimic Simulation Studio modeling palette. These Objects are rigorous first-principles, dynamic models of process plant unit operations designed for high performance simulations for operator training or automation system testing.

## Benefits

### Intuitive unit operation modeling objects

This set of modeling objects comes with modeling infrastructure that makes the development of accurate models quick and easy. Advanced model flowsheets can be built in PFD objects or IEC1131 block user interface.

### Scalable from medium to high fidelity simulation

Users can configure these objects to as close to the actual equipment and process data as desired. The Advanced Modeling Objects allow for models with simple conservation of mass and energy as well as rigorous mass and heat balance, reaction kinetics, and vapor-liquid equilibrium.

## Intuitive configuration parameters allowing for quicker model building

Mimic Advanced Modeling Objects allow selection of certain configuration parameters for each object individually so the user can input them in the form that it exists in the plant design data. Parameters include units, size, elevation, and other physical specifications, while also including composition, fluid, solid, and other components.

## Includes common process plant unit operations found in the process industries

Mimic Advanced Modeling Objects include unit operations commonly found in process industries. The objects include the more common objects such as vessel, valve, pump, heat exchanger, but also operations in power generation, specialty chemicals, solids handling, industrial reactors, bioreactors, and more.

## Easy handling of individual stream component properties

Streams pass an array of information between the modeling objects including component concentration and activity, physical properties, and piping design information. They connect unit operation models and pass complete process data between them.

## Product Description

Mimic Advanced Modeling Objects include the following common unit operations:

- **Advanced Sink** - dynamic termination or boundary condition end for process streams.
- **Advanced Source** - dynamic source or boundary condition start for process streams.
- **Bin** - dynamic model of an open to atmosphere storage container.
- **Compressor** - dynamic model of centrifugal and axial compressors with discharge curve characterization and performance view.
- **Conveyor** - dynamic model of bi-directional, variable-speed, fixed-length belt conveyors.
- **Dynamic Heat Exchanger** - wide dynamic range heat exchanger models with flash (VLE) calculation.

- **Flow Panel** - represents a physical interface between multiple pipes, providing the ability to map one input to one output and change this association online via an array parameter.
- **Heat Exchanger** - high precision heat exchanger with stream fouling and ambient temperature loss controls and flash calculation.
- **Pipe Delay** - statically or dynamically provides stream flow delay.
- **Plate and Frame Heat Exchanger** – high precision heat exchanger with stream fouling and ambient temperature loss controls and flash calculation. Designed to meet the needs of complex LNG/LPG unit operations.
- **Pressure Reducing Valve** - dynamic model of transfer between steam headers. Includes an option for Fisher Valves where direct coefficients from Fisher Controls Severe Service Catalog can be used to configure the model.
- **Pump** - dynamic model of process pumps with pump curve characterization and performance view.
- **Stream Input, Stream Output** - boundary blocks for handling stream inputs and outputs to the process model.
- **Valve** - dynamic pressure, flow calculation across throttling valves configured to the installed valve characteristics.
- **Vessel** - complete mass, heat, and pressure balance for process vessels. For solids modeling, the vessel supports initial particle size distribution based on either RosinRammler or Gates-Gaudin-Schuhmann models to assist with specification of the initial material.

## Advanced Modeling Objects Infrastructure

Mimic Advanced Modeling Objects include modeling infrastructure that makes the development of accurate, dynamic process models in Mimic quick and easy. This infrastructure includes:

- Mimic Thermodynamic Properties Database
- Mimic Process Streams
- Mimic Component Sets
- Mimic Engineering Unit Handling
- Mimic Dynamic Flow Solver

### Mimic Thermodynamic Properties Database

The Mimic Thermodynamic Properties Database includes over 1700 commonly used chemical compounds. The database contains all relevant thermodynamic properties and has been validated against the National Institute of Standards and Technology (NIST) database, managed by the United States Department of Commerce and AIChE Design Institute for Physical Properties (DIPPR). When a component is selected in a Mimic Component Set, the Mimic Advanced Modeling Object selects the appropriate thermodynamic property to use in the model. In addition, the thermodynamic property can be selected for use in a Mimic Calc block for custom modeling.

Mimic Component Property Editor allows the user to add proprietary component thermodynamic data or pseudo component for use in a Mimic Component Set.

### Mimic Process Streams

Connections between modeling functions in Mimic base modeling functions are made with Wires. Wires pass the floating-point value of the connection, the status, and the engineering units. In Mimic Advanced Modeling Objects, connections are made with Streams. Streams pass an array of information between the modeling objects including component concentration and activity, physical properties, and piping design information. The single Stream connection allows the user to quickly connect unit operation models and pass complete process data between them.

### Mimic Component Sets

Mimic Component Sets provide a simplified method for selecting and managing stream components. Component sets are selected and managed in Mimic Explorer under the library section. Any combination of chemical components found in the Mimic Thermodynamics Properties Database can be grouped together. Once the component set is defined, it can be used in any Advanced Modeling Object by selecting the given name of the Component Set.

### Mimic Engineering Unit Handling

Mimic Advanced Modeling Objects allow the user to select the engineering units for each object individually so the user can input configuration parameters in the form that it exists in the plant design data. Within each object, the dynamic simulation calculations are solved in SI units and then displayed to the user in the selected units. Differences between objects are resolved by the Mimic Simulation Server on the Stream connection. This sophisticated system saves time in building and maintaining dynamic simulations in Mimic.

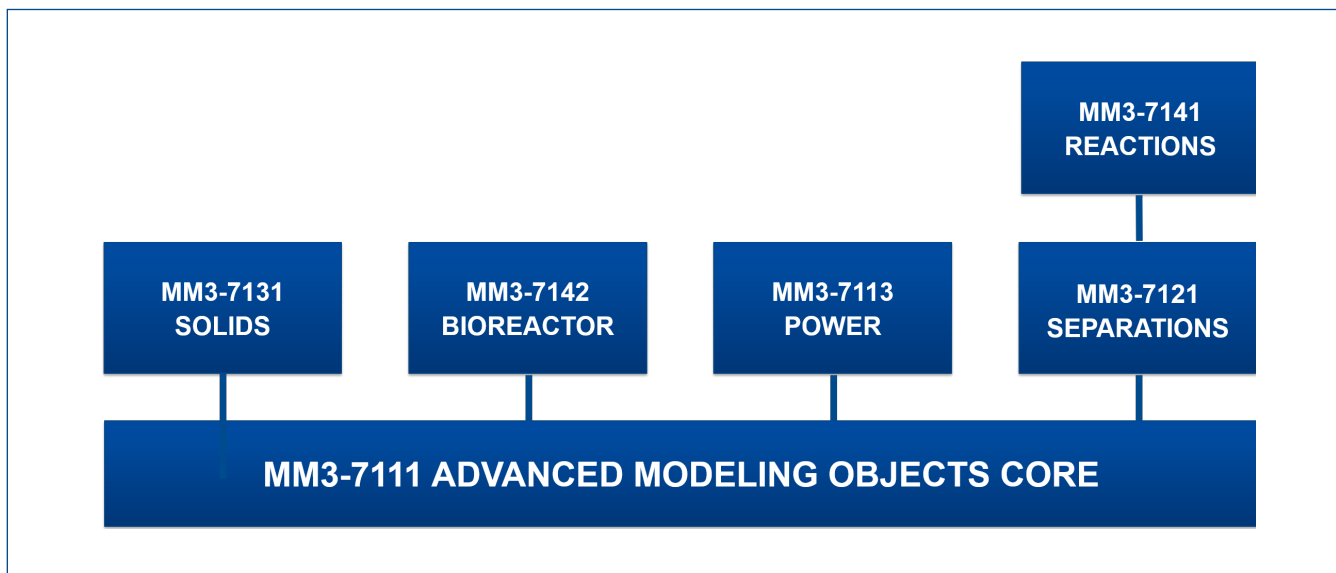
### Mimic Dynamic Pressure Flow Solver

Mimic Advanced Modeling Objects include a dynamic pressure / flow solver that solves the flows and pressure balances throughout the Mimic Advanced Model flowsheet. When the Pressure Flow option is selected, in a Mimic Advanced Model, the pressure and flow is calculated based upon an object type:

- Active Nodes include accumulation objects (like the Vessel) and also Pump and Compressor Objects, internally calculate pressure and/or a flow demand.
- Passive Nodes including the Stream T and Heat Exchanger.
- Transport Nodes including Streams and Valve Object.

All nodes are simultaneously evaluated at execution time. Passive nodes have their pressures calculated and all flows are calculated based on transport unit resistance (Stream/Valve Cv) and flows are assigned. The dynamic Pressure / Flow solver does not require any user intervention to configure or tune. Stream Flow calculations can be evaluated based upon Mimic Cv or Kfactor flow type. The Kfactor flow calculation method utilizes pipe length, diameter, fittings factor, dynamic viscosity and density of material.

## Ordering Information



Advanced Modeling Objects - Core is required before adding more packages.

Description	Model Number
Mimic Advanced Modeling Objects - Core	MM3-7111
Mimic Advanced Modeling Objects – Power	MM3-7113
Mimic Advanced Modeling Objects – Separations	MM3-7121
Mimic Advanced Modeling Objects – Reactions	MM3-7141
Mimic Advanced Modeling Objects – Bioreactor	MM3-7142
Mimic Advanced Modeling Objects – Solids	MM3-7131

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