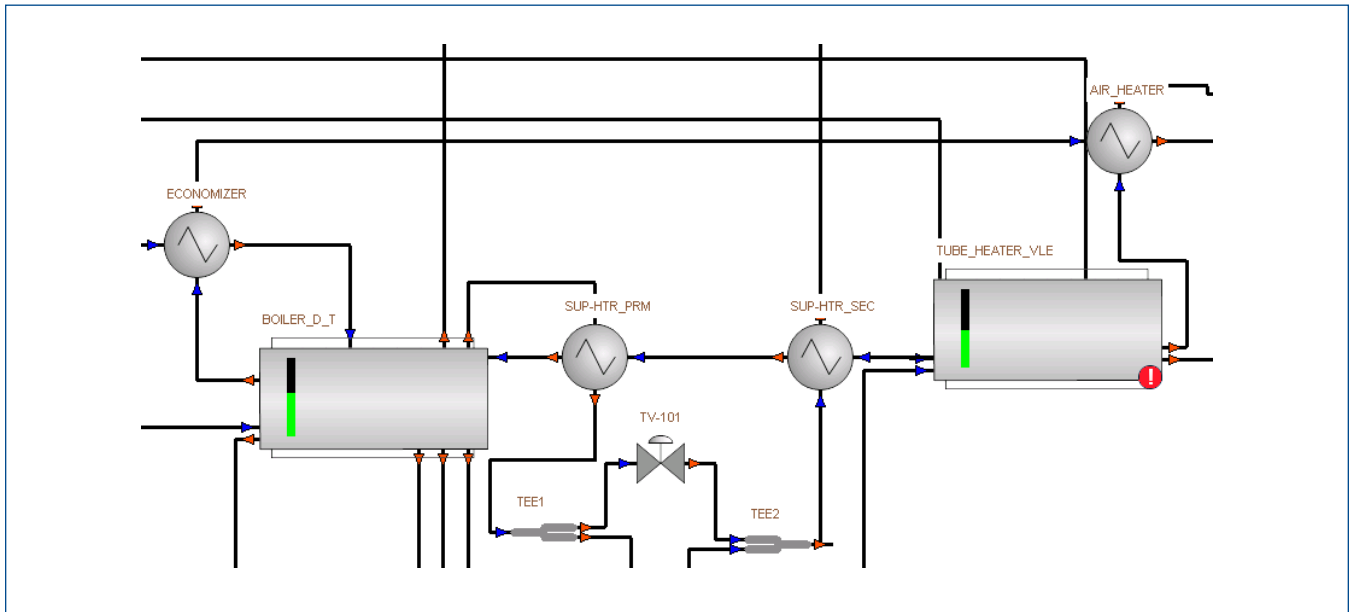


# Mimic™ Advanced Modeling Objects – Power



- Intuitive unit operation modeling
- Supports complete boiler system simulation
- Provides realistic Drum modeling including dynamic shrink/swell with compensation
- Accurate thermodynamics and steam quality calculations based upon integrated steam tables (IAPWS-IF97 standard)

## Introduction

The Mimic Power Modeling Objects provide high fidelity dynamic models for unit operations commonly found in power plants including coal boilers, gas/oil boilers, waste incinerators, and cogeneration units.

The Power Modeling Object Package is an add-on to the Mimic Advanced Modeling Objects package that includes sophisticated modeling objects into the Mimic Simulation Studio modeling palette. These objects can be used on Mimic systems for application software testing, operator training, and process or operation improvements.

## Benefits

### Intuitive unit operation modeling

These modeling objects come with modeling infrastructure that makes the development of accurate models quick and easy.

### Supports complete boiler system simulation

While there are a variety of boiler processes, in general a complete solution for a boiler facility will include dynamic simulation for Steam & Mud Drums, Economizers, Superheaters, Attemperators, Desuperheaters, Steam Headers, Deaerators, Furnaces, Natural Gas/Oil/Solid Fuel System, and Air Systems (ID Fan, FD Fan, and Scrubber).

Provides realistic Drum modeling including dynamic shrink/swell with compensation.

This level of process modeling allows the user to accurately model the complex dynamics of a boiler and train plant personnel on safe operations.

Accurate thermodynamics and steam quality calculations based upon integrated steam tables (IAPWS-IF97 standard).

The integration of the latest steam table standards provides accurate thermodynamics, vapor-liquid equilibrium, and steam quality calculations, with no additional work for the process modeler.

## Product Description

The Mimic Power Modeling Objects provide high-fidelity dynamic models for unit operations commonly found in a wide range of the power generation facilities configurations. The objects include:

- **Fuel Object** that can be characterized for gas, oil, coal, wood, or other fuel source.
- **Boiler with Furnace Object** providing complete combustion model, water and steam balance model and all associated equipment.
- **Steam Header Object** for complete mass and energy balance of saturated or superheated steam flows across entire header.
- **Furnace Object** providing complete combustion model and heat transfer for up to 8 fuels.
- **Turbine Object** for complete steam and power generation balance.
- **Multi-Stage Turbine Object** for complete steam and power generation balance with a single injection source with up to 100 stages.

Each modeling object in the Mimic Power Modeling Package includes specific parameters designed for quick configuration.

### Fuel

The Fuel Object can be characterized for gas, oil, coal, wood, or other fuel source. Composition can be characterized for precise combustion modeling in mass or molar basis. The fuel composition can be specified for carbon, hydrogen, sulfur, nitrogen, and oxygen content, as well as overall heat capacity.

Fuel objects are used in conjunction with Boilers only. Boilers may be configured for one or more fuels. Each specified fuel in a Boiler is supplied by a Fuel object; therefore, the fuel object has an unlimited supply.

### Boiler with Furnace

The Boiler with Furnace object provides a complete integrated model of the combustion process and steam / water balance in the power plant boiler. The modeling basis is proven power generation stoichiometry and first principles mass and energy balances. Up to five fuel feeds can be configured for each furnace with any combustion source available from the Mimic Fuel Object. The combustion model is complete and accurate including flue gas composition, energy generated, full combustion characteristics modeled. Water/Steam balance model has all components of the boiler including the Steam Flow, Feed Water Flow, and Drum Level. Boiler equipment is accurately modeled with user selections for each subsection of the boiler including Primary Superheater, Desuperheater, Secondary Superheater, Economizer, Air Heater, and Precipitators.

The Boiler object comprises a Furnace, Air heaters, Economizer, Boiler Drum and Super Heaters. Together all this equipment functions as three distinct sub-systems.

- Furnace
- Water Side
- Steam Side

**Steam Header**

The Steam Header Object is built to handle saturated or superheated steam from up to 8 inlet streams, distributed to up to 8 outlet streams. Pressure, temperature, and total steam mass of the header are modeled. A complete, rigorous mass and energy balance is calculated across the entire header each second.

**Furnace**

The Furnace Object provides a complete combustion and heat transfer model for steam generators or process furnaces. Up to 8 fuels of any type can be configured for each object.

A complete furnace energy balance is used to determine flue exit temperature. Flue concentrations are determined stoichiometrically. NOx, CO, CO2 and O2 concentrations are adjusted for thermodynamic equilibrium. The temperatures used in the equilibrium calculations have factors that can be tuned to match actual flue data.

The Furnace can be configured for forced draft, induced draft, or both. With induced draft, an external flue rate must be supplied, and the model execution must be set fast enough to avoid pressure oscillation

**Turbine**

The Turbine Object provides a complete Steam and Power Generation Balance around this equipment including the Steam Inlet Extraction and Exhaustion Balance. The Turbine object supports all commonly used operation modes and can be run in pressure control, power control, or extraction flow control modes.

**Multi-Stage Turbine**

The Multi-Stage Object provides a complete Stream and Power Generation Balance with user-defined configuration of up to 100 stages and 5 user defined extraction points. This object supports all commonly used operation modes and can be run in pressure control, power control, or extraction flow control modes.

**Ordering Information**

The Mimic Power Modeling Objects can be added to any Mimic system by first adding the Advanced Modeling Objects - Core license.

Description	Model Number
Mimic Advanced Modeling Objects - Core	MM3-7111
Mimic Advanced Modeling Objects – Power	MM3-7113

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