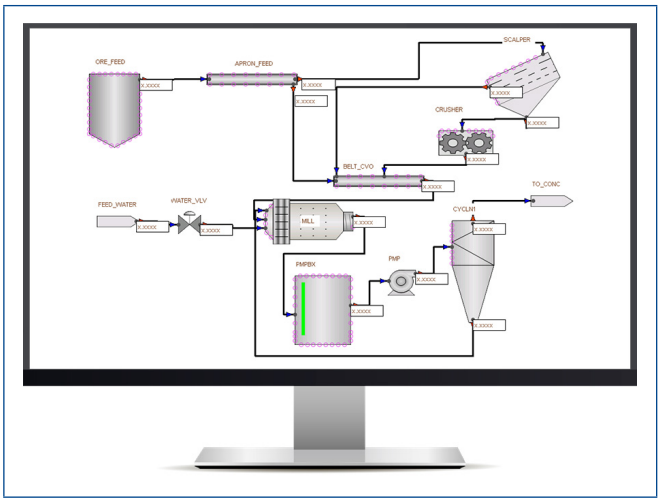
DeltaV™ Mimic Process – Solids

- Intuitive unit operation modeling
- Supports solid components in addition to the liquid and gas phases
- Accommodates changing distributions of solid sizes
- Provides online size distribution data for decision support



Introduction

DeltaV™ Mimic Process – Solids provide high-fidelity dynamic models for unit operations commonly found in mineral processing plants as well as particle size distribution tracking and tunable breakage matrixes for comminution operations.

Benefits

- **Intuitive unit operation modeling –** These modeling objects come with modeling infrastructure that makes the development of accurate models quick and easy.
- **Supports solid components in addition to the liquid and gas phases –** Solid components are mapped into user-defined size categories with up to 20 size categories allowed per stream. Size categories are defined in the simulation in source blocks, or in any block which performs comminution and alters the size distribution (such as screens or crushers). Initial distributions within the size categories will be defined in the source blocks as mass percentages.
- **Accommodates changing distributions of solid sizes –** Mining unit operations that change the distribution of solid sizes have a consistent tunable comminution or breakage matrix. The breakage matrix defines the distribution of particle size from inlet to outlet of the equipment and is tuned with the matrix variables and rate scalar for ore characteristics and hardness.
- **Provides online size distribution data for decision support –** Included with flexible, powerful particle size distribution (PSD) in the Mimic Mining Process Objects are tools to support better operations decision making for the mill manager or metallurgist. PSD View displays P30, P50 and P80 marks for each size distribution in process streams in addition to cumulative size distribution tracking. No configuration is required to use PSD View on the dynamic model of a mining process.

Product Description

DeltaV Mimic Process – Solids enables sophisticated process objects found in mineral processing plants in 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. The objects include:

- Compactor Object providing compaction of solid components.
- Crusher Object for jaw, cone, gyratory and high-pressure grinding roller (HPGR) Crushers.
- Cyclone and Cluster Cyclone Object for the classification of solid components by size in their carrying fluids.
- Mill Object for ball, rod, autogenous, and semi-autogenous milling of solid components.
- Screen Object providing size classification of solid components.
- Centrifuge Decanter for continuous clarification of mixed solid and liquid streams.
- Flotation Cell for the separation of solids based on raw material hydrophobicity and froth properties.
- Settling Tank for the separation of solids based on density.

Compactor

The Compactor object represents a roller compactor with a force feeder. It is designed to work with solid components. The performance depends upon the feed temperature, the pressure applied to the rollers, and the cut size of the feed material. User configured Polynomials convert each of these parameters to a quality. The three quality values are then weighted to produce a final quality value that determines the effectiveness of the compaction.

Crusher

The Crusher object performs size reduction based on a breakage matrix, and power estimation using several standard estimator functions.

The object also includes an integrated hopper, which simplifies feed control to the crusher. Material in the hopper is not subjected to crushing. Material flows from the hopper into the crushing segment at a rate configured as the crusher capacity.

Cyclone and Cluster Cyclone

The Cyclone object represents both hydro cyclones and dry cyclones. Depending upon the phase of its feed, the Cyclone will automatically adjust its calculations to handle the appropriate phase. Cyclones Clusters of up to 100 units can be configured and are supported by the Pressure Flow Solver.

A critical diameter is configured for each component. Particles of that size or larger have a 100% probability of exiting through the underflow. The user can also specify a minimum probability that all particles, regardless of size or component, have of exiting through the underflow.

Mill

The Mill object represents ball mills, rod mills, autogenous mills (AG), and semi-autogenous mills (SAG). The outlet can either be an overflow or a grate. It performs size reduction based on a breakage matrix, and power estimation using several standard estimator functions. The initial distribution mechanism can be based on either Rosin-Rammler or Gates-Gaudin-Schuhmann models to assist with specification of the initial material.

For ball, rod, and SAG mills, the grinding media is tracked separately from the process material. The mass of media currently in the mill is available separately from the total mass, and media can be added separately as well. The grinding media is strictly an internal attribute of the Mill, so it does not appear in the component set. The media does not directly impact grinding performance. This can be managed by adjusting the Mill's rate scalar in a low-level model.

Screen

The Screen object represents a stack of mesh screens. The number of screens can be configured, as well as the mesh-opening diameter, capacity, efficiency, and other parameters for each individual screen in the stack.

Undersized material passes through one screen to the next until it reaches a screen too fine to pass through. It then exits through that screen's oversized output. Each screen can be configured with a maximum retained liquid percentage. The output of that screen oversize will never contain more liquid, by mass percentage, than the configured maximum. Excess liquids exit through the final underflow output. Vaporous mass always exits through the first oversized output.

Centrifuge Decanter

A Centrifuge Decanter is a horizontal, continuous centrifuge that uses a screw to move centrifuged solids to a discharge. Clarified liquids are removed by overflowing a weir. The bowl of the Centrifuge Decanter only fills to the weir height. Separation is achieved through the screw moving solids toward one end, up a sloped surface until it is above the weir height, and out the discharge. Liquids simply overflow the weir.

The relative speed of the screw and the bowl determine the wetness of the solids discharge. A slower screw speed allows for more compaction, which results in a dryer solid discharge.

Flotation Cell

Froth flotation is a physicochemical separation process used in a wide variety of mining applications. The Flotation object can be used to model cells or columns. The difference in surface properties of the raw materials plays a significant role in the process. Generally, the species comprising the raw materials are either hydrophobic or hydrophilic, while others can be chemically altered to become hydrophobic such that they float.

In Mimic, a flotation cell is a vessel containing a slurry (or pulp) with a mixture of particles with different surface properties with respect to water. When air bubbles are introduced into the pulp, the hydrophobic particles will attach to the buoyant bubbles and float away from the suspension to the froth layer at the top of the slurry where the particle-laden bubbles are collected as product. The hydrophilic materials or tailings settle to the bottom of the cell where they are removed and rejected. The initial distribution mechanism can be based on either Rosin-Rammler or Gates-Gaudin-Schuhmann models to assist with specification of the initial material.

Settling Tank

The Settling Tank object represents settling tanks, or thickeners without a rake. The Settling Tank is open to atmosphere. The initial distribution mechanism can be based on either Rosin-Rammler or Gates-Gaudin-Schuhmann models to assist with specification of the initial material.

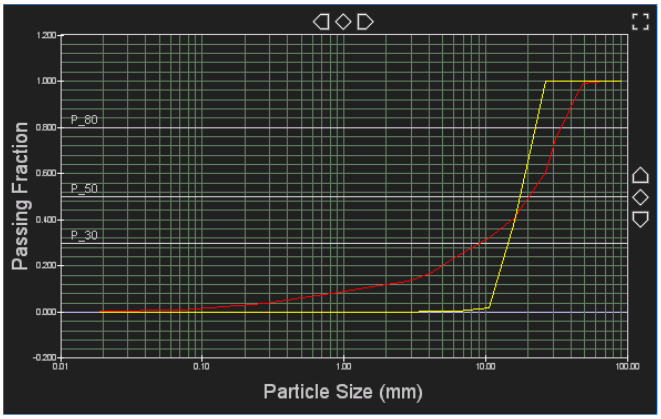
The tank is divided into horizontal layers, and particles are tracked as they fall under gravity from one layer to the one below it. As particles reach the bottom of the Settling Tank, they form a mud layer, whose overall density is specified during configuration.

The Settling Tank can have an optional agitator. When present and enabled, the agitator inhibits settling.

Settled material can be drawn from the bottom of the settling tank, or out through side-draws. Liquids and floating material flow out from the top of the tank.

Particle Size Distribution (PSD) View

The Particle Size Distribution (PSD) view allows users to view size distribution data online for solids blocks. With data selected, the PSD view shows a plot of passing fraction versus particle size.



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Ordering Information

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