ParaMagic™ - SysML Parametrics for MagicDraw

ParaMagic plugin makes MagicDraw SysML models come alive! Using the quantitative information and constraint relationships displayed in SysML diagrams, model-builders can run simulations from the earliest stages of system design. In traditional domains of system engineering like aerospace and transportation, users can explore system performance, estimate cost and allocate resources. Developers leveraging MagicDraw's DoDAF and business modeling capabilities can add parametric simulation using SysML submodels for defense planning, business process analysis and computational finance. Download the ParaMagic plugin demo version at http://www.magicdraw.com/paramagic

ParaMagic uses Mathematica™ (Wolfram Research) as the mathematical solver for the parametric relationship. ParaMagic is packaged as a plugin to the MagicDraw UML/SysML tool and is available for separate purchase by new and existing MagicDraw customers. Price is $999/€669.

Constraint Relationships

Mathematical relationships handled by Mathematica include basis arithmetic and exponentiation, trigonometric, exponential, and logarithmic expressions, and MINIMUM, MAXIMUM, SUM and AVERAGE functions. Because many equations can be solved non-causally, i.e. in any direction, ParaMagic-based models can be explored fully, with easy exchange of inputs and outputs. Mathematica can be installed on the local computer, or ParaMagic can support server-based licenses or web services.

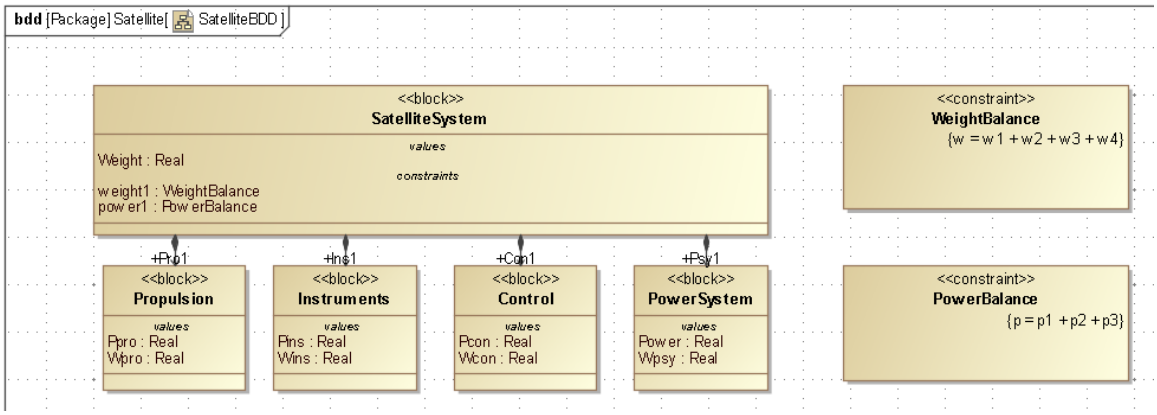
SysML ParaMetrics

The SysML 1.0 specification supports properties, constraint blocks and parametric diagrams, but until ParaMagic, this information couldn't be put to use beyond documentation. Collaborative modeling and simulation becomes easier with a visual representation of model structure and partitioning complex models into subsystems encourages object-oriented discipline in model design. The MagicDraw TeamServer implementation lets specialists share the model while providing a governance mechanism in collaborative environments.

Functionality	SysML	MagicDraw SysML + ParaMagic
Structure Diagrams	X	X
Behavior Diagrams	X	X
Requirements Diagrams	X	X
Parametric Diagrams	X	X
Model Simulation		X
Trade Studies		X
"What If" Scenarios		X

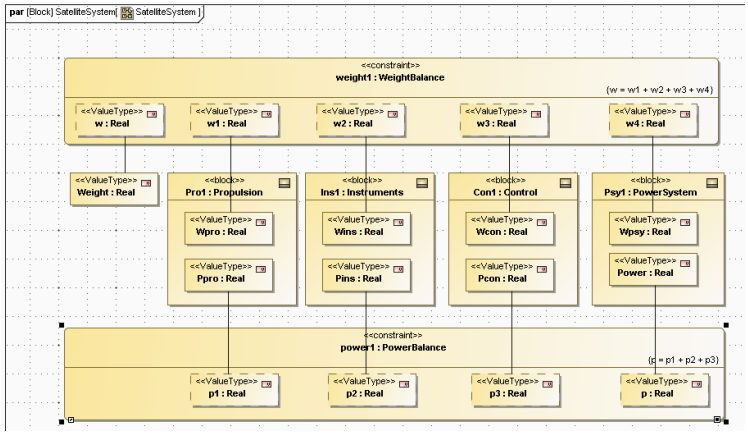
Examples of SysML Diagrams and Parametric Results

Block Definition Diagram with System Components, Properties and Constraints

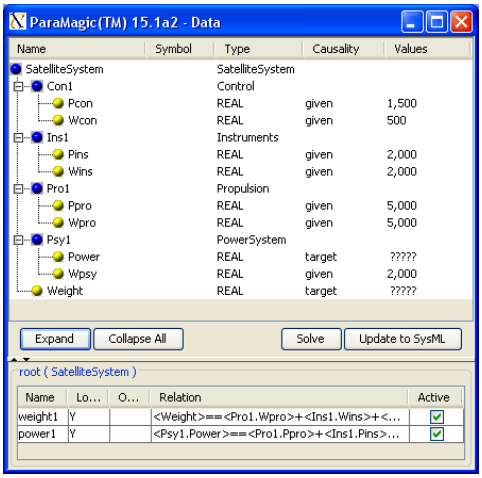


In a simple example, a satellite with four subsystems needs to meet weight and power budget requirements. Constraint blocks, which may be re-used from previous projects, are added to the model and parametric diagrams provide the wiring between the component attributes, like propulsion system weight and the analysis equations, like WeightBalance. The ParaMagic browser summarizes the model parameters, assigns them as givens or unknowns, and prepares the system of equations for export to the mathematical solver. Results appear in the browser and can be uploaded into the SysML model.

Parametric Diagram



ParaMagic Browser



Questions?

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