Integration with pure:variants

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Prerequisites

- The *PureVariantsProfile.mdzip* profile is used.
- A feature model is defined in the pure::variants program.
- A system model (a superset or 150% model) is defined in the modeling tool developed by No Magic Inc., e.g. MagicDraw.

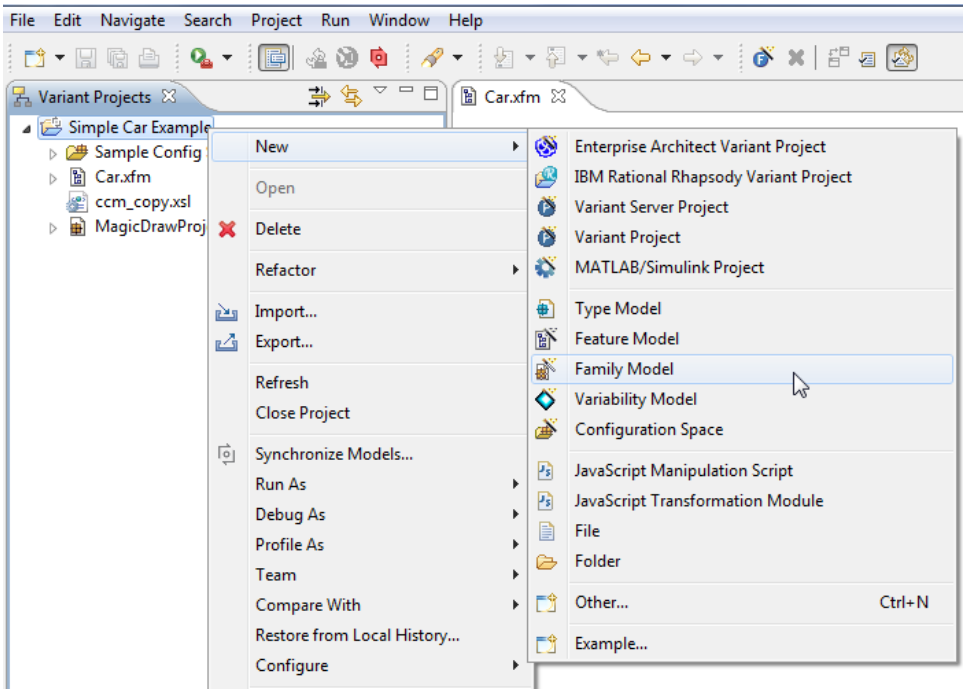
Modeling tool
MagicDraw as a modeling tool is used in descriptions as an example.

Connecting feature and system models

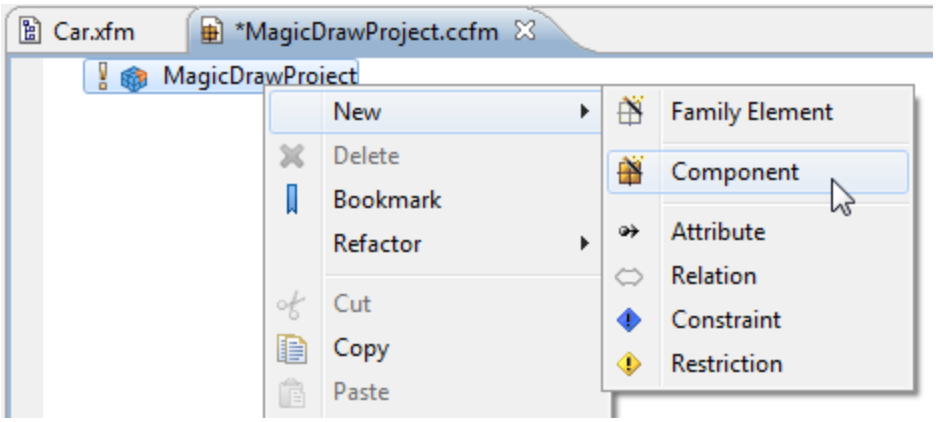
To connect feature and system models

Note
This procedure is required when starting the project for the first time.

1. In pure::variants, open the feature model. In the modeling tool, open the system model.
2. In pure::variants, specify the feature project:
   a. In the **Variant Project** view, right-click your model folder and select **New** > **Family Model**.

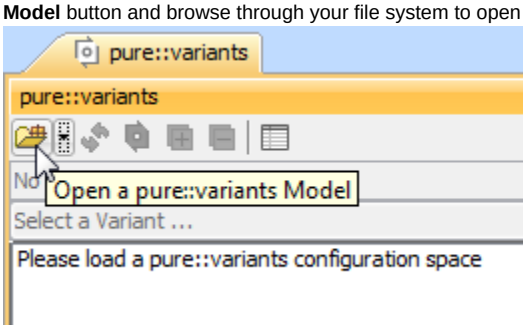


   b. In the **Family model name** box, type the name of a family model and click **Finish**.
   c. Create a Component. In the Family Model Editor pane, right-click the created family model and select **New** > **Component**.



d. In the **New Element** dialog, type a Component name and click **Finish**.
e. Create a MagicDraw project:
   - If a system model is local, in the Family Model Editor pane, right-click the created Component and select **New** > **MagicDraw Project**. In the open dialog, specify the .mdzip file of your system model as the **file** value. Click **Finish** when you are done.
   - If a system model is in a server, TBD.

3. In the modeling tool, set the pure::variants focus. Switch to the modeling tool. In the **pure::variants** window, click the **Open a pure::variants Model** button and browse through your file system to open the pure::variants configuration file.



Specifying the variation points in the system model

In the system model (in a modeling tool), you must specify variation points and define how the feature choices impact the variation point. Variation points can be set on Blocs.

To set variation points

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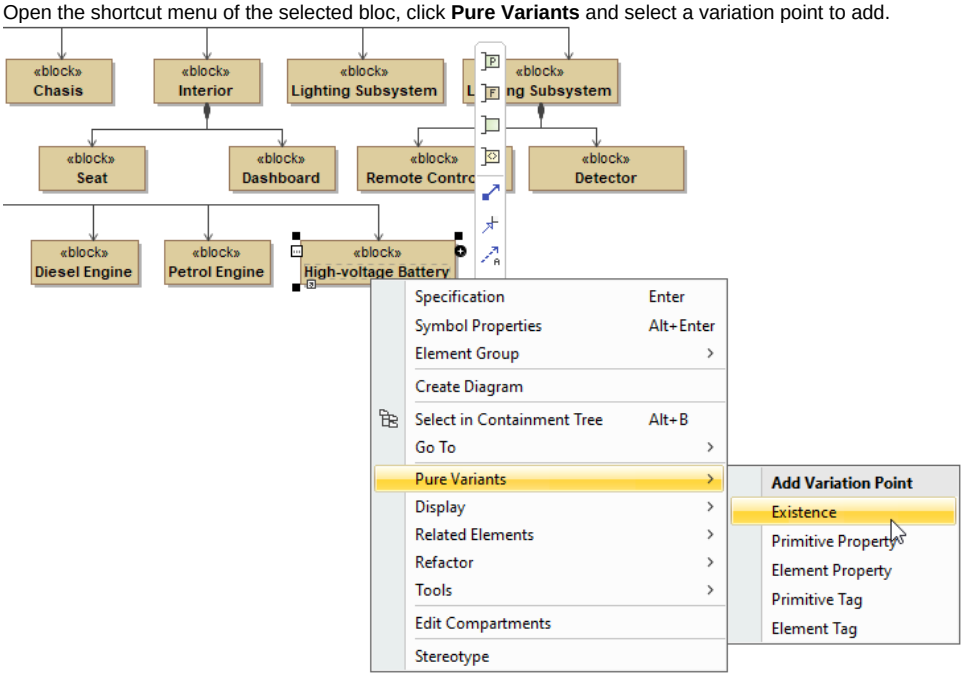
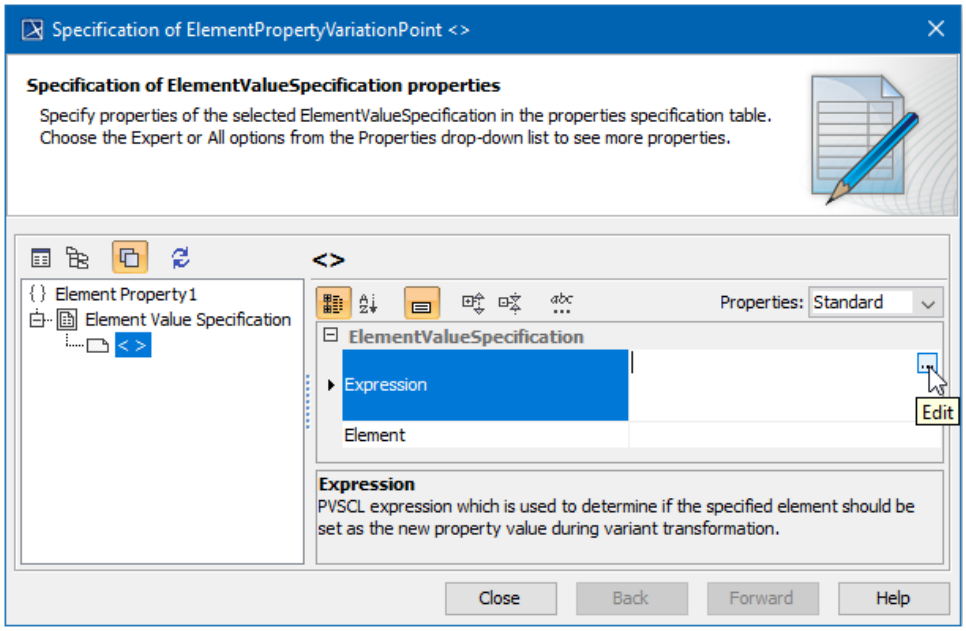
1. In the Block Definition Diagram (BDD), select a Block (either an element in the Model Browser or a symbol on a diagram pane) for a variation point.

2. Open the shortcut menu of the selected bloc, click **Pure Variants** and select a variation point to add.



Variation point kind	Description	Values to specify
Existence	Select it to control the existence of a model element in variant models. The element can either exist or be removed in a particular variant model depending on a variation condition.	Expression (boolean)
Primitive Property	Select it to set the values of UML model element properties that accept *strings*, *numbers*, *booleans* as values. Typical examples are default value (*numeric*), multiplicity (*numeric*), documentation (*string*), name (string).	Name of the property that is controlled by this variation point. Expression returning the value for that property.
Primitive Tag	Select it to set the values of model element properties that accept *strings*, *numbers*, *booleans* as values, in cases when a property is not a standard UML property but defined as a tag in an extension profile. A typical example is a requirement text.	Name of the tag that is controlled by this variation point. Expression returning the value for that tag.
Element Property	Select it to control the values of those UML model element properties that accept other UML elements as values. A typical example would be a property type, property default value for enumeration-type properties.	Name of the property that is controlled by this variation point. Element Value Specification with a table of pairs: condition-value, where each condition is a *boolean* expression.
Element Tag	Select it to control the values of tags that accept other UML elements as values in cases when a property is not a standard UML property but defined as a tag in an extension profile.	Name of the tag that is controlled by this variation point. Element Value Specification with a table of pairs: condition-value, where each condition is a *boolean* expression.

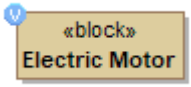
3. The **Edit Expression** dialog opens, where you can add an expression to filter a model according to selected features. If you select **Element Property** or **Element Tag** as a variation point, the variation point Specification window opens. In the property group list, select the Element Value Specification property and click the **Create** button to add a condition-value pair, where each condition is a *boolean* expression and a value is an element. Create as many pairs as are needed. Click the Edit button to open the **Edit Expression** dialog.



Editing an expression

You can edit the expression in the element with a variation point assigned Specification window. The expression is stored as a property in the Constraints property group.

4. Repeat steps #1 to #3 for all Blocks you want to assign as variation points in your model. Model elements assigned as variation points are marked with a blue variation sign in the Model Browser, as well as their symbols (shapes and paths) on a diagram pane.



Notation of a Block having a variation point assigned.

Generating of a particular product variant

After you assign variation points, you can generate a particular product variant.

To preview a particular product variant realization

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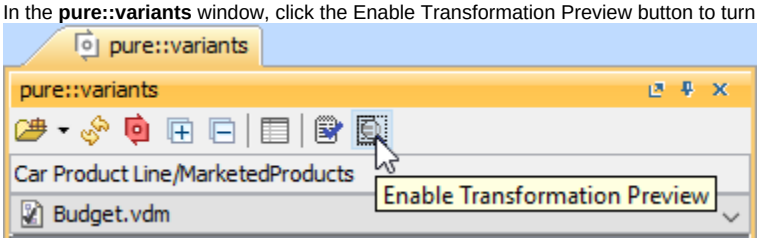
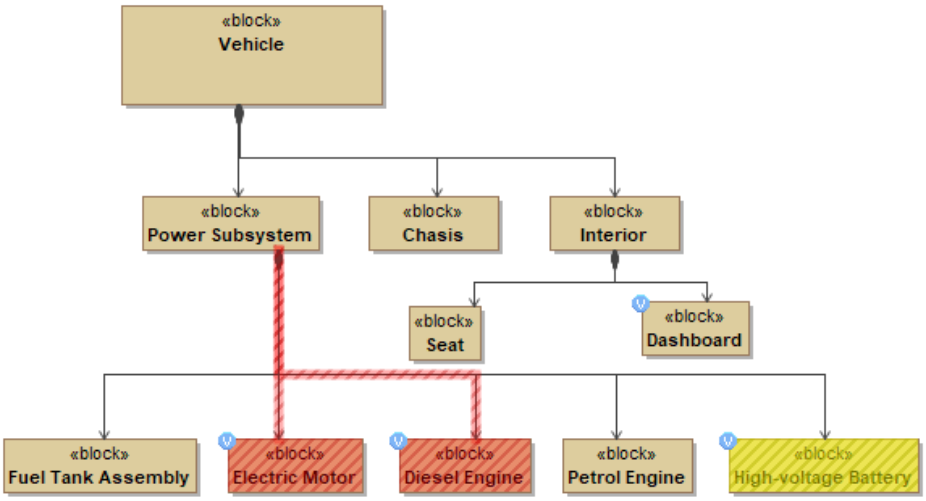
1. In the **pure::variants** window, click the Enable Transformation Preview button to turn the preview on.



2. Click **Select a Variant** and select a particular variant from the list. In the model:
   - Items that are not included in a selected variant appear in red.
   - Items depending on the result of a defined expression appear in yellow, meaning the result depends on a property that could be set for an element according to the expression.



Elements in red are not added to the selected model variant. Elements in yellow change according to the defined expression.

To generate a particular product variant

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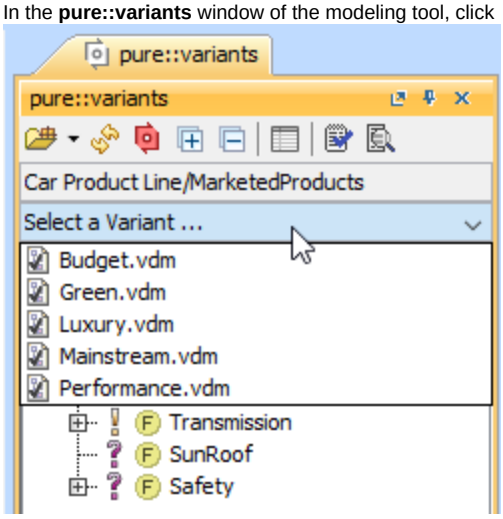
1. In the **pure::variants** window of the modeling tool, click **Select a Variant** and select a particular variant from the list.



2. On the main menu, click **Tools** > **Model Transformation**.
3. The **Model Transformation Wizard** opens. In the wizard, select **Variant Realization** and click **Next** to proceed to the following step.
4. Select the transformation source - a Package where your system model is stored.
5. Click **Finish**, when you are done. Models not needed according to a selected variant configuration are removed from the model.

pure::variants

Generating particular variants can be performed in pure::variants as well. In this case, you can cut elements not just of the system model in MagicDraw, but of all artifacts connected to the pure::variants project, e.g., requirements, documentation, and others.

Related pages

- Integration with Big Lever Software Gears
- Creating variants using transformations

Other resources

- Product Line Engineering with Cameo Systems Modeler and pure::variants. A record of the webinar.