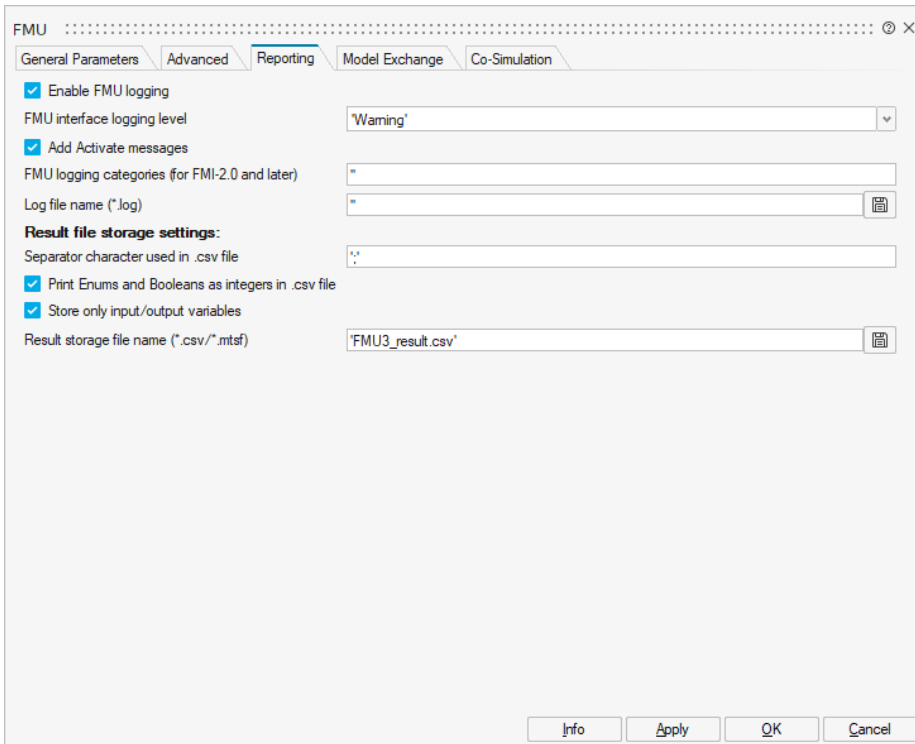**RELEASE NOTES**

Altair Twin Activate® 2023

# New Features and Enhancements 2023

## Release Highlights

FMI 3 Extended Support

- A CSV writer for FMI-3.0 import has been added to let you write internal variable values of FMU to a CSV file during simulation.

- Handling of fixed structural variables with dependencies has been added to let the user change the dimension sizes of input, output, and internal variables at the initialization.
- Safe mode has been added for FMI-3.0 import to execute FMU in a separate process.
- Enumeration, Int64, and UInt64 data types are now handled in FMI-3.0 import.
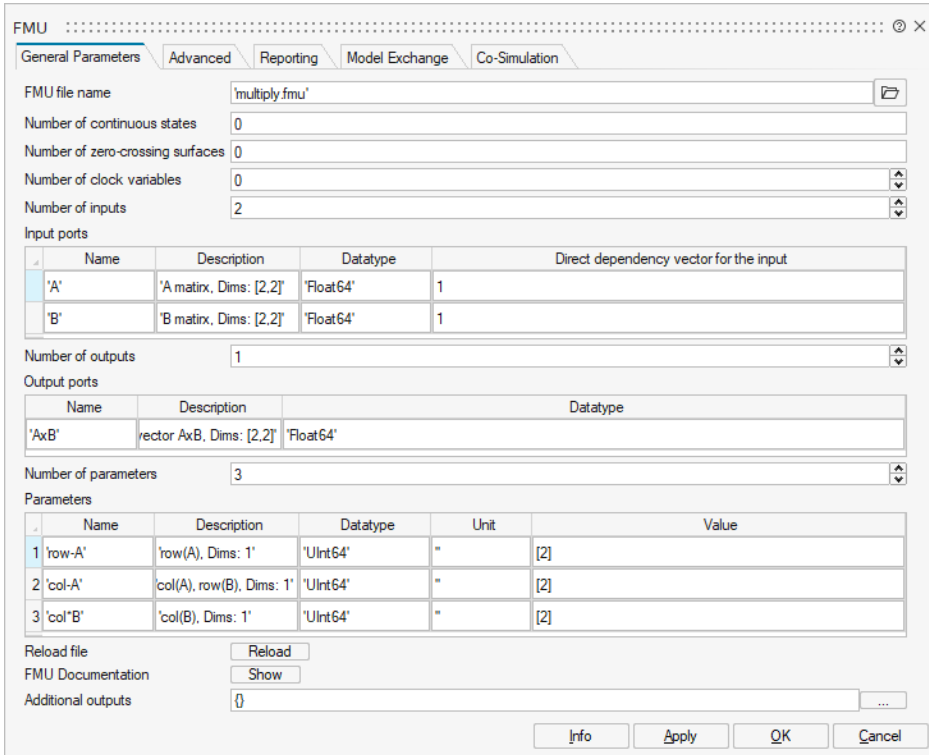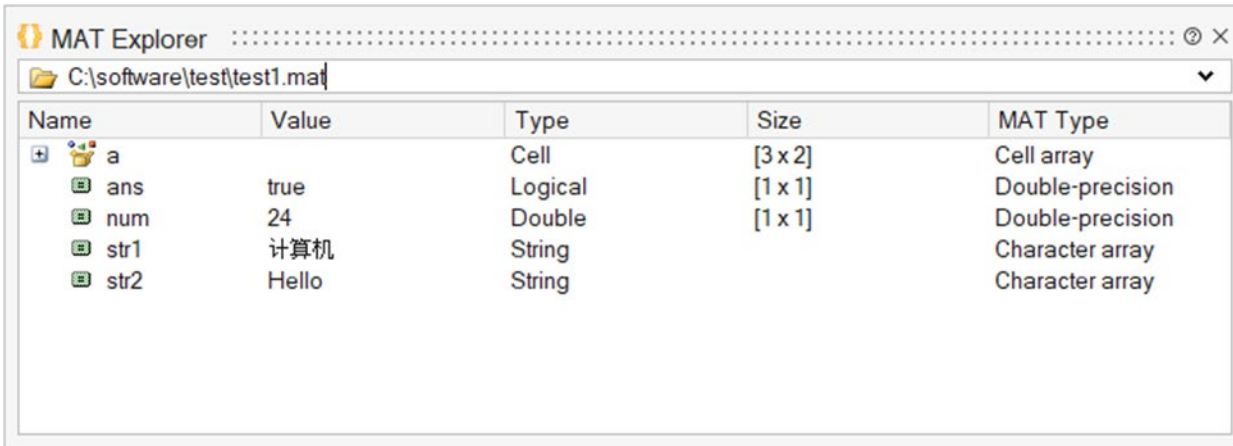
- Support has been added for FMI-3.0 with a source code interface and build configurations.

- An embedded solver has been added that allows exporting Modelica models with inline FMU export.
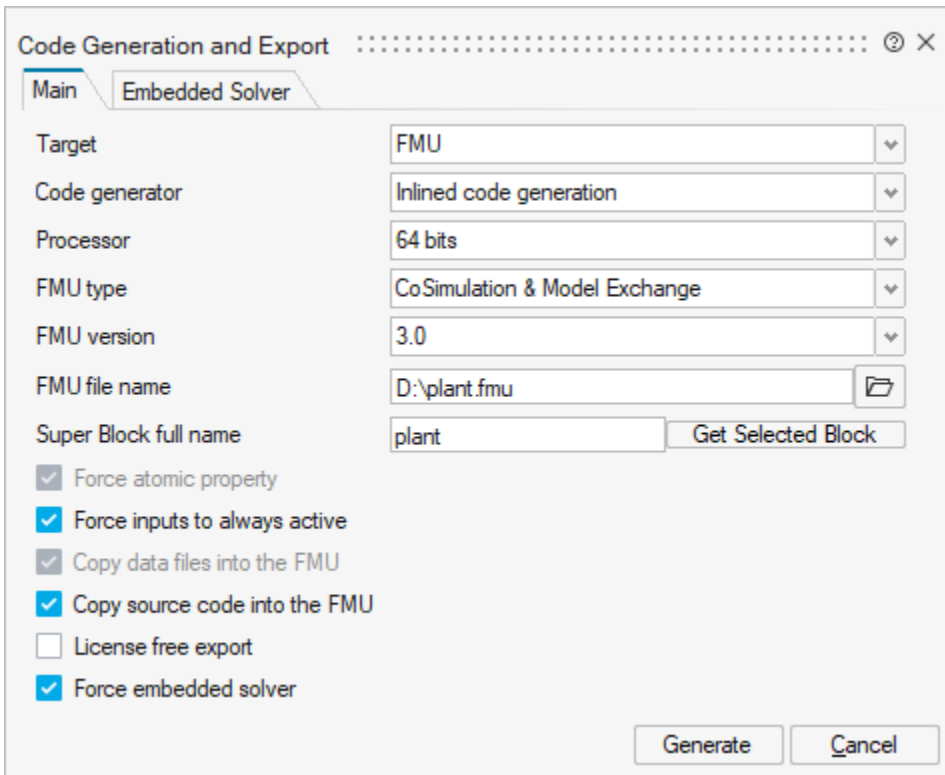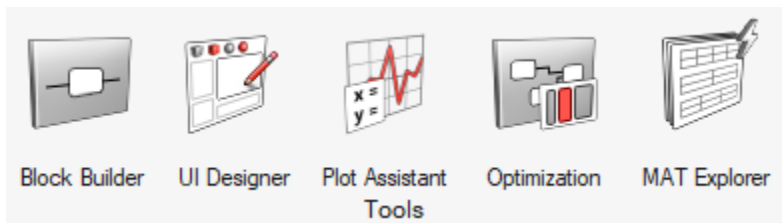

MAT Explorer

MAT Explorer is a GUI interface to explore and load variables from a .MAT file.
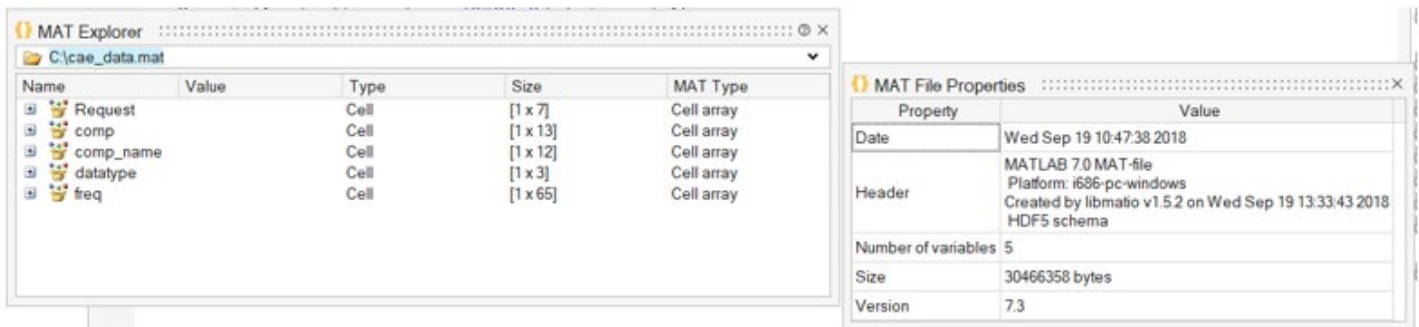
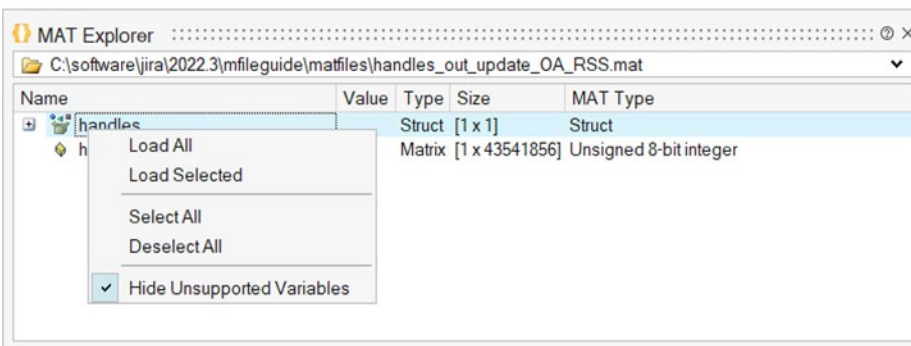You can open the MAT explorer from Tools ribbon.

Features include:

- Data tree to inspect variables along with their name, value, type, size, MAT type from the .MAT file.

- The button on the right of the file name gives the file properties after it has been read.

- Right-click on any of the variables to open a context menu to load the variables in the current Twin Activate session.


- Load All: loads all the variables in the current Twin Activate session.

- Load Selected: loads selected variables in the current Twin Activate session.

- Select All: Selects all the variables

- Deselect All: Deselects all the variables

- Hide Unsupported Variables: hides unsupported variables if any

Quick insertion of blocks by name

Inserting components from the palette into a model sometimes requires many clicks. The new Insert Block feature shortens the procedure considerably and lets you directly select components via text search.

To open the search dialog box, right-click in the diagram, and then select **Insert Block**. You can also use the shortcut **Ctrl+Ins**.
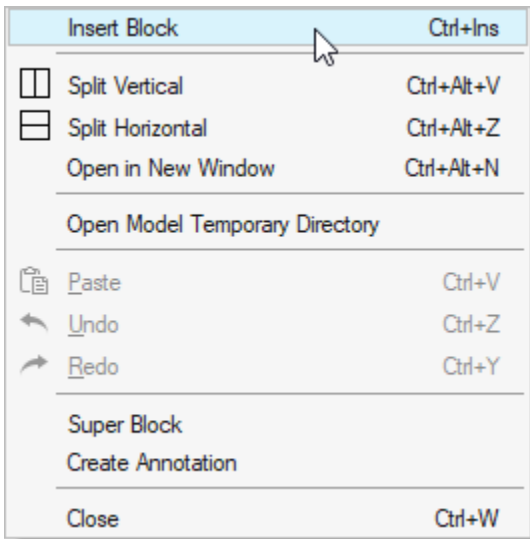
Results are shown after you type at least three letters.
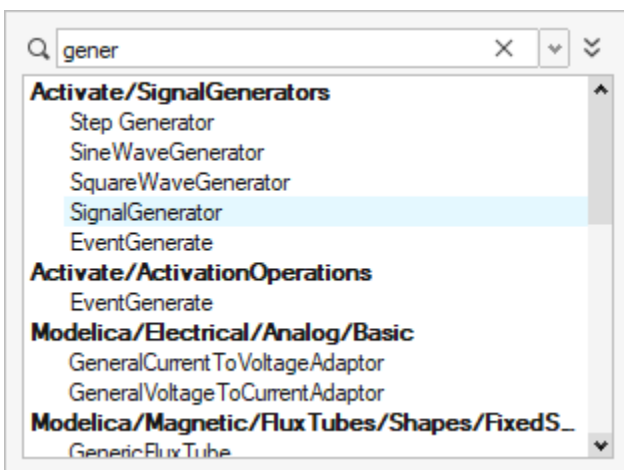
To select the first block on the list, press **Enter**.

Use the up and down arrows to navigate the filtered list of blocks.

To add a block to the model, select a block and press **Enter**, or double-click.

Press **Escape** to close the dialog box without adding a block.

Code Generation and Export*

License-free export

Some libraries, such as romAI, need an additional license. The License free export option lets you generate FMUs and other targets without the need of drawing license units at runtime. This feature is intended to support systems that do not have access to licensing, such as embedded systems.

Note: This feature requires an additional license.
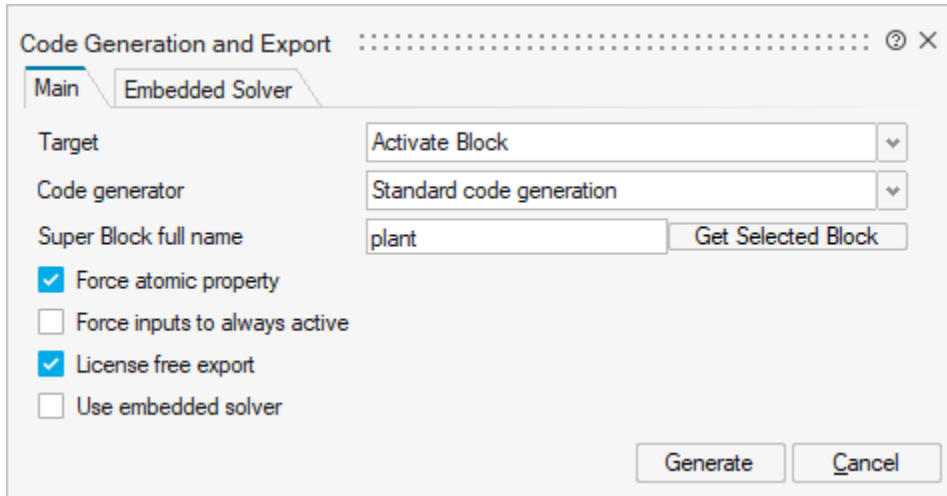

Full support of embedded solvers

Solver inlining transformation is a method to embed a numerical solver in the generated code. This transformation can be applied to a general Twin Activate model or part of it. This turns it into a purely discrete-time synchronous model. The resulting discrete-time super block behavior matches the original super block as closely as possible.

With solver embedding, models with Modelica components and co-simulation FMUs are supported by inlined code generation.
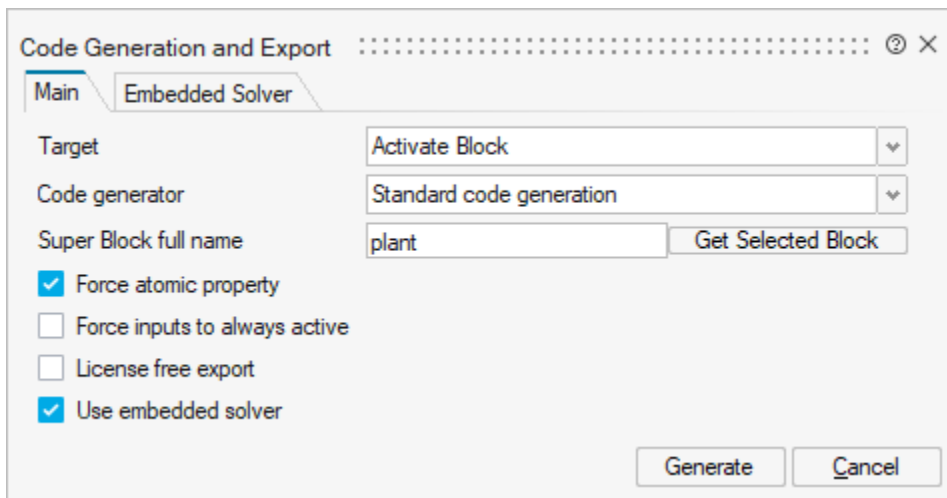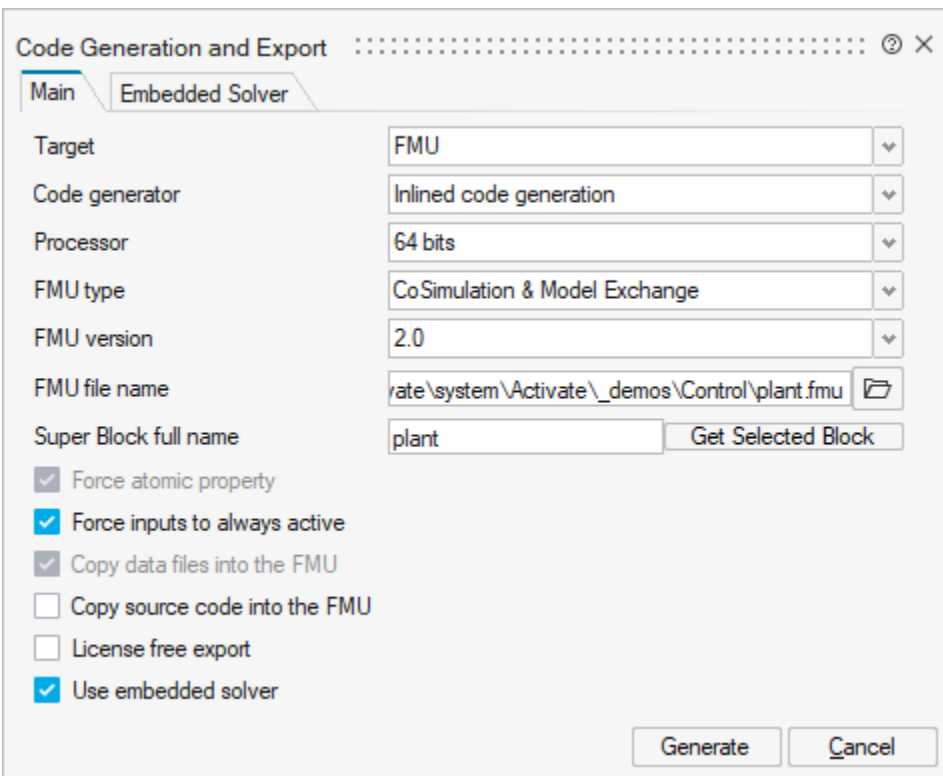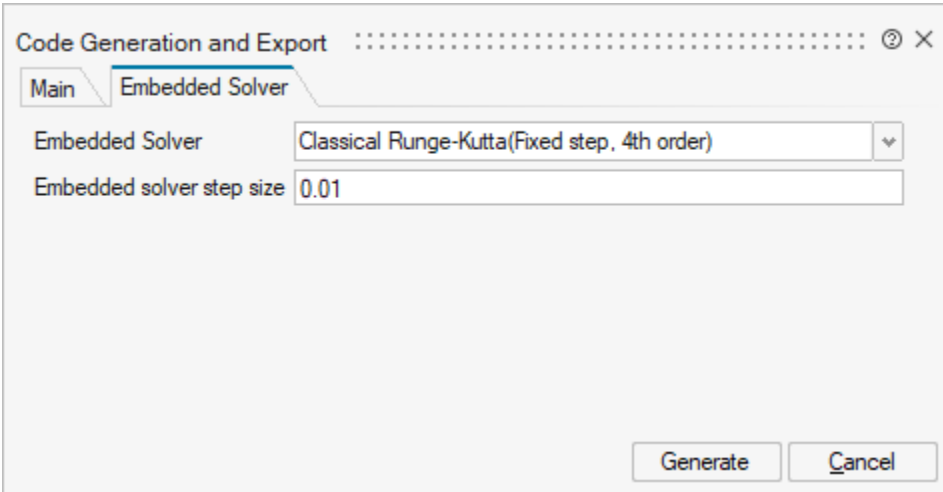
More details are provided in the new Chapter 22.6.4 Embedded solver option in Extended Definitions. Extended Definitions can be found in the online help in Reference Guides > Extended Definitions for Advanced Users.

User Interface

New ribbons

The menu has been reorganized according to the typical workflow so that ribbons are shown for Simulation, Modeling, Export, and Tools.
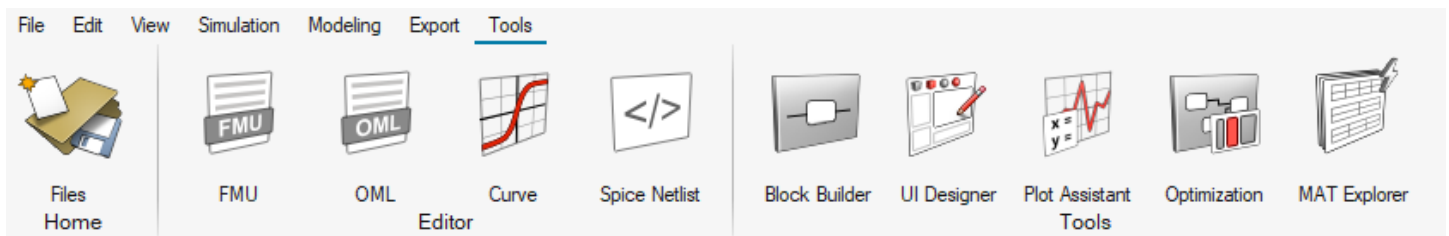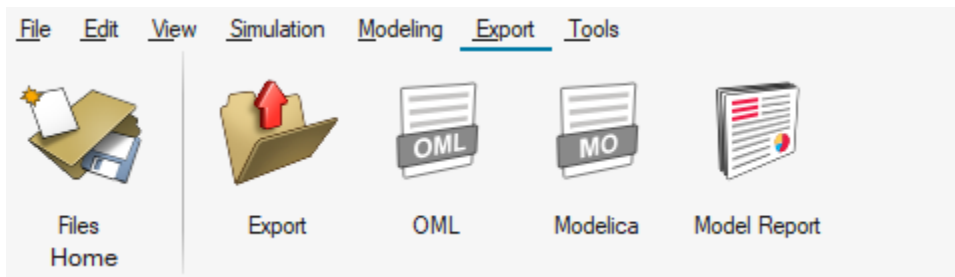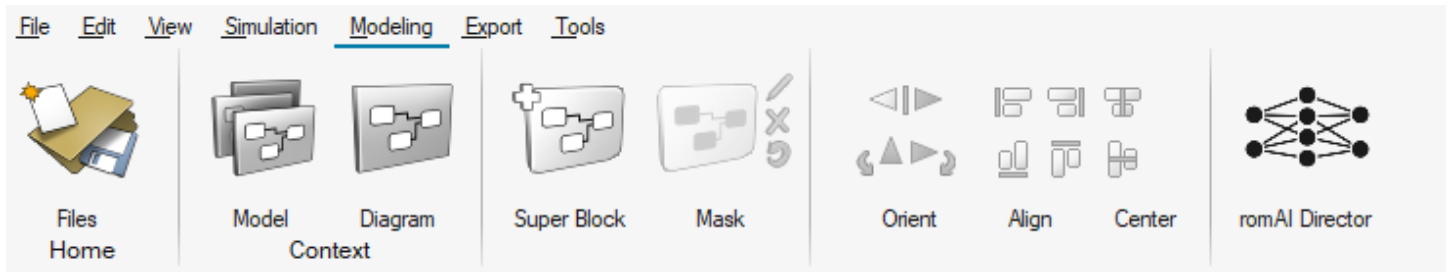
Advanced tooltips

When you hover over an icon, advanced tool tips are now shown. In addition to a description, the associated hotkey is shown and you can press F1 to open the corresponding help page.
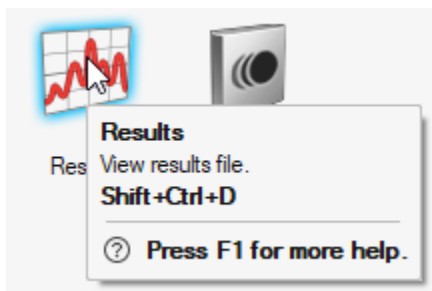
Redesign and enhancements of romAI Director*

New UI
A new workflow improves ease of use.
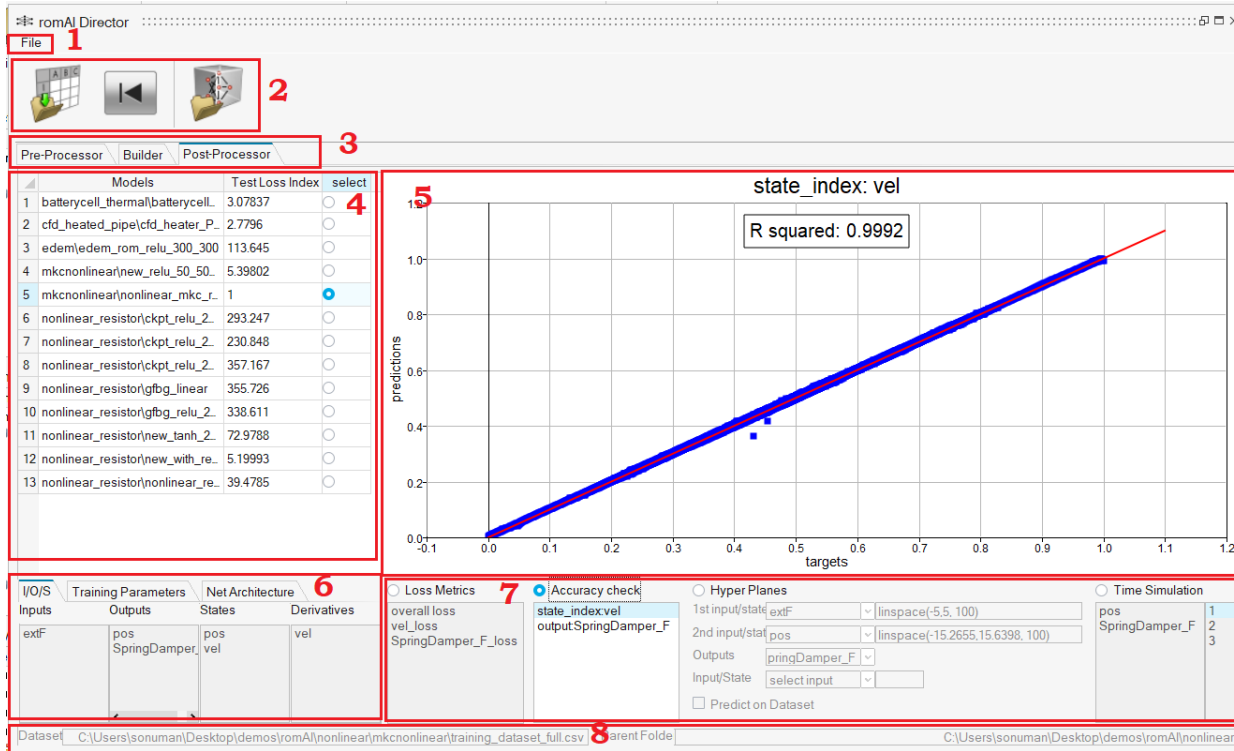
The GUI has the following sections:

1. File Menu: Contains generic actions

2. Top ribbon: Buttons based on the uipushtool feature

3. Tabs: Provide the switching feature

4. Left table: Choose signals and models

5. Canvas: Shows plots

6. Left panels: Show dataset and model information

7. Right panels: Input parameters

8. File information text boxes

The Pre-Processor lets you plot, filter signals, and save data.
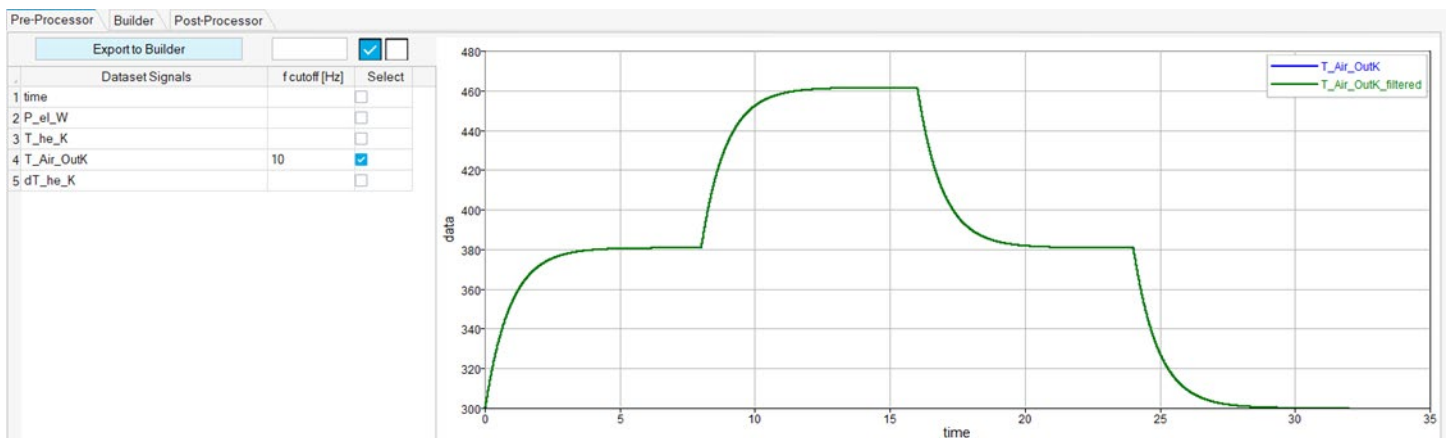
The Builder has the following functions:

- Arrange the parameters in tabs

- Add a table for all features that go in training

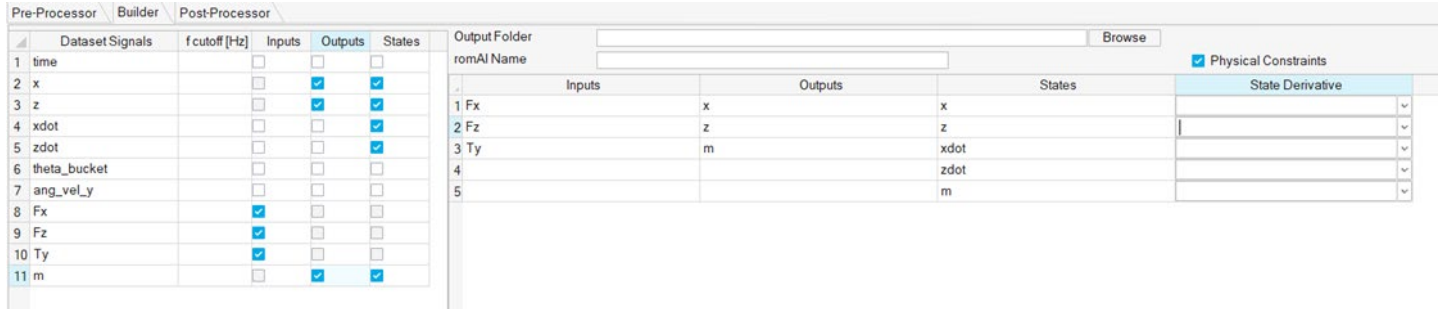- Physical Constraints can be selected using a drop-down menu instead of writing

The Post-Processor has the following features:

- Visualize all results (Loss metrics, Accuracy Check, Hyper Planes, and Time Simulation) on a single page and with fewer clicks

- Process more than one model without loading models repeatedly
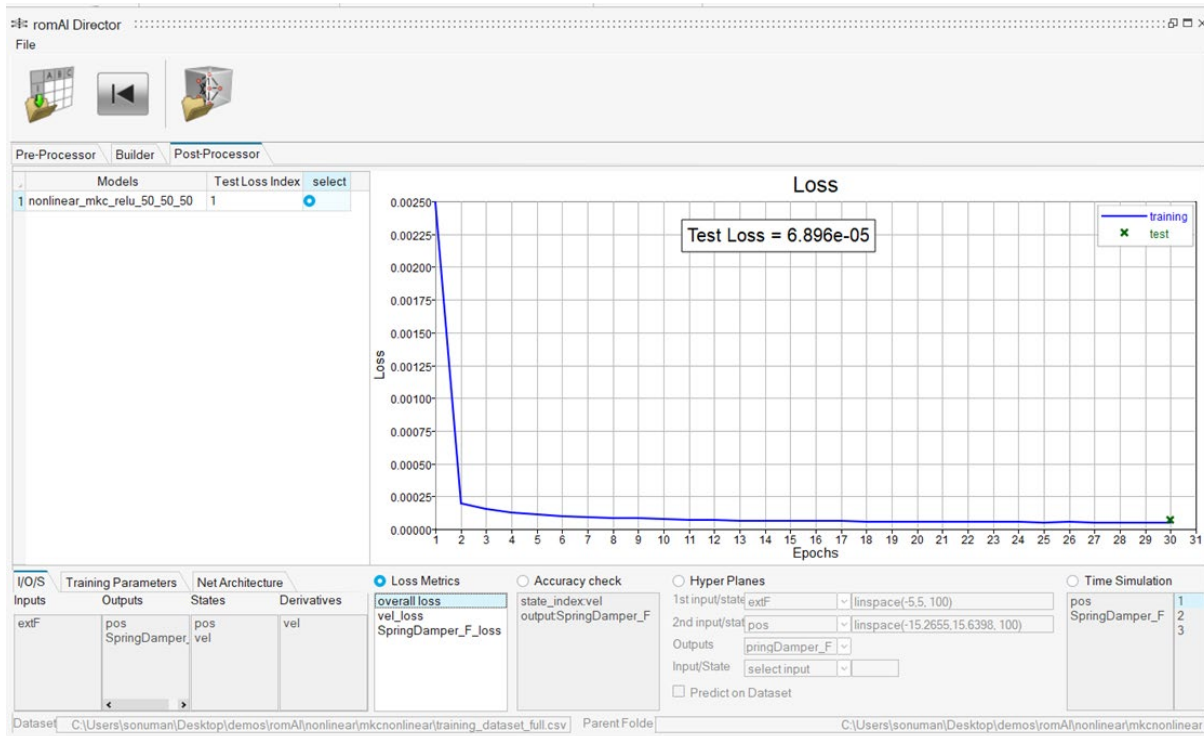
Heat Map

A Heat Map has been added to show the correlation among features. This helps you select features based on correlation coefficient. The Correlation Coefficient slider helps to get most correlated features.
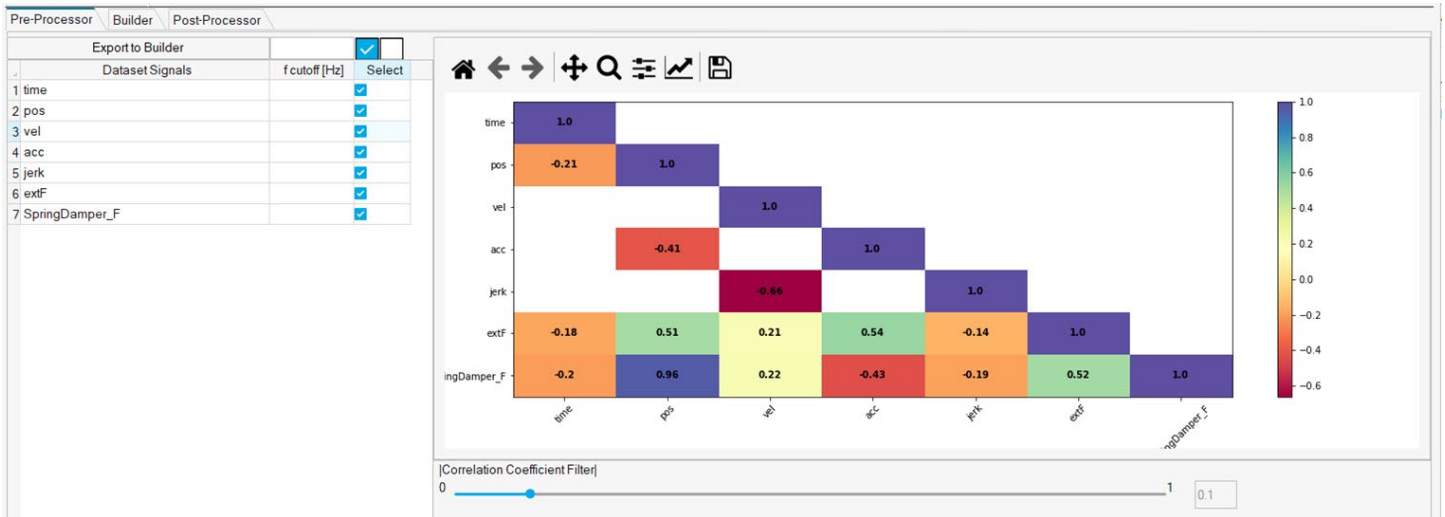
Auto Exploration

Auto Exploration lets you train multiple models with different hidden layers, activation functions, and neurons.

Stop Training

To stop model training, click the **Stop** button.
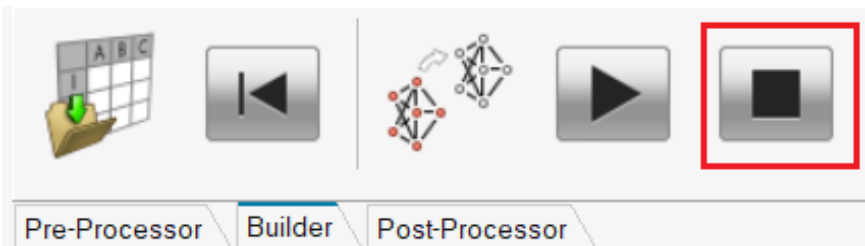
Libraries

Additional Changes and Enhancements for Libraries

Use path to load and unload extensions

You can use a path to load and unload the extension. This supports several versions of the library. A function has been added to avoid raising an error in OML when calling *installlibrary* from the UI. *installlibrary* raises different errors and ignores errors if the same library with the same path is already installed.

Simport

Call of Simport has been moved from the main menu to the **File** > **Import**.

HydraulcisByFluidon*

There is a new resistor type with input of alphaD * A

The associated demo file is *Resistor with AlphaD.A input.scm*.

Enhancements

Enhancements for Code Generation and Export*

include external OML function calls inside P block
You can now include external OML function calls inside a P block. The load and unload should be done in flags 4 and 5.

The external function works both in simulation and code generation.

The associated demo file is *Synchronizing Pendulums.scm*.

New blocks
MaxMinInterval block has been added.

Blocks supported by the embedded solver are:

- ContPoleZero
- ContStateSpace
- ContTransFunc
- Derivative
- EventClock_Support
- EventDelay
- EventGenerate
- EventVariableDelay
- FixedDelay
- Integral
- JumpStateSpace
- LastInput
- MaxMinInterval
- Ramp
- SineWaveGenerator
- StepGenerator
- Time
- VariableDelay
- ZeroCross
- ZeroCrossDown
- ZeroCrossUp

Enhancements for User Interface

Unsaved indicator in project browser
In the Project Browser, a model that has not been modified has a black icon.
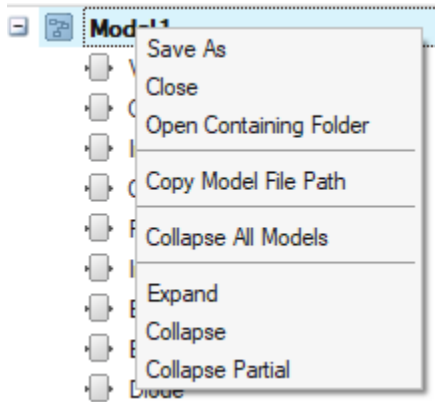
When a model has been modified, the icon is red. If you right-click on the icon has a Save option.
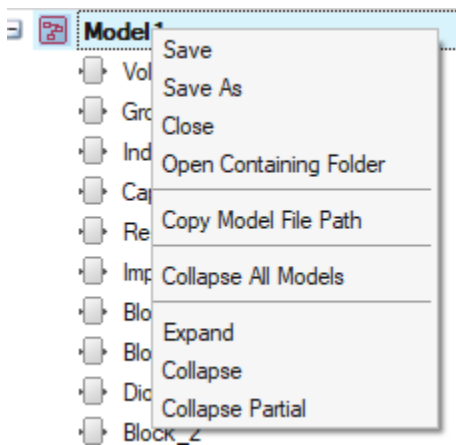
Message Center

A simulation error message now includes the simulation time and the causing block.

Resolved Issues

UI

- When libraries are uninstalled by a startup script, the palettes should be removed from the maps.

- Super block expansion failed with unconnected activation port.

- Curve Editor interpolation selection was wrongly deactivated.

- Block orientation was not correct after generating a super block and undoing.
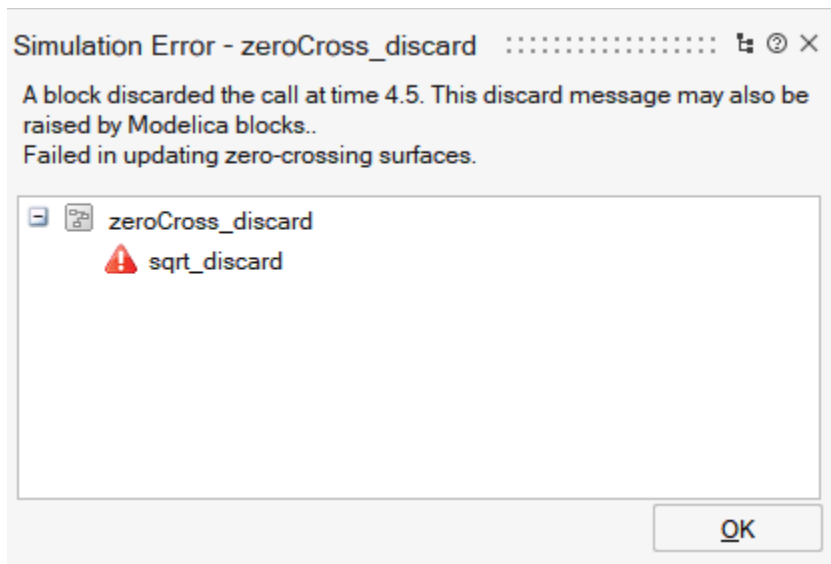
- Insert block from library and Save as should use different "previous paths."

Code Generation

- Fixed bug in inlined FMI2 export when copying the source code. *

- Inlined code generation resulted in an incorrect initial event in some cases for the Edge block.

Modelica

- [Pneumatics Library] parType was not considered in VariableOrifice. *

- There was a Multibody animation issue (engine 1a.scm).

Miscellaneous

- Fmuchecker:
  - Removed "press any key."
  - Set default start time to 0.
  - Set default end time to 10.
  - Raise an error if no input file is set.

- Simulation Results section of HTML report was empty if a scope name contained spaces.

- tcc was not usable for Modelica model with activate_batch.

Linux

- There was an FMU compliance check failure for nested FMU containing Modelica.*

Known Issues

Extensions created with previous Activate versions cannot be loaded with Twin Activate 2023. When they are added in the Extension Manager, nothing happens.

Solution: Add Twin Activate as a client in plugin.xml in the folder where the extension was created.

Original plugin.xml:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<section name="Extension">
  <entry name="name" value="Demo Extension"/>
  <entry name="author" value=""/>
  <entry name="description" value=""/>
  <entry name="documentation" value=""/>
  <entry name="resources" value=""/>
  <entry name="icon" value=""/>
  <entry name="version" value=""/>
  <entry name="minProductVersion" value=""/>
  <entry name="supportedClient" value="Activate"/>
</section>
```

New plugin.xml:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<section name="Extension">
  <entry name="name" value="Demo Extension"/>
  <entry name="author" value=""/>
  <entry name="description" value=""/>
  <entry name="documentation" value=""/>
  <entry name="resources" value=""/>
  <entry name="icon" value=""/>
  <entry name="version" value=""/>
  <entry name="minProductVersion" value=""/>
  <entry name="supportedClient" value="Activate"/>
  <entry name="supportedClient" value="Twin Activate"/>
</section>
```

* Applies to Standard Edition only